Pests

AND THEIR CONTRO

1943

MAY

VOL. 11 NO. 5

ORGAN OF THE PEST CONTROL INDUSTRY

Exterminators
Fumigators
Termite Control Operators
Entomologists
Insecticide and Supply Mfgrs.

THESE REDWINGS MIGRATE DAILY—FOR FOOD!

Control Him with "CYANEGG"—HCN FUMIGATION!

THE INDIAN MEAL MOTH has wings tinged with reddish-brown. Each female lays about 350 eggs on or near larval food material. They hatch in 4 to 6 days.

Properly applied HCN gas is an effective fumigant for control of this and other insect and animal pests. It can be generated economically from "Cyanegg."

Your nearest "Cyanegg" distributor can give you detailed information.

E. I. du Pont de Nemours & Co., (Inc.)
Electrochemicals Department,
Wilmington, Delaware.

DU PONT
REG. U. S. PAT. OFF.

CYANEGG
Reg. U. S. Pat. Off.
An Economical Source of HCN Fumigating Gas

BETTER THINGS FOR BETTER LIVING . . . THROUGH CHEMISTRY

HOW THE PROFESSIONAL EXTERMINATOR CAN HELP TO WIN THE WAR

Wars may come and wars may go but there never can be an armistice in the war to keep the home front safe from disease and infestation. Neither bottlenecks, nor priorities, nor scarcities, nor the heavy new problems brought on by huge concentrations of men and machines dare call a halt in the work of the professional exterminator. Today, more than in peacetime even, he truly is the indispensable soldier behind the lines.

Are materials scarce? Use the best you can get, and make every ounce of killing power do its wasteless most. *Is labor hard to get?* Increase your efficiency of operation to the utmost. *Are prices higher than before the war?* Look ahead to the day of peace when, by holding fast to the ideal of quality throughout these trying times, you will have the foundation for a greater, more rewarding era of prosperity.

Are conditions tough? Sure they are! For you, for us—and above all for our boys on the far-flung battlefields of this global war.

Do your best. We'll do ours. Together, we will lay the groundwork for the better times that are surely ahead.

HIGH-POWER AMMUNITION IN THE FIGHT ON THE HOME FRONT:

HOPKINS' CONCENTRATED PYRETHRUM EXTRACTS
20-1 5-1
Made only from 100% commercially pure, high-testing Pyrethrum Flowers

HOPKINS' REDRATSQUIL POWDER OR LIQUID
Made from the genuine Red Squill bulbs, oven-dried under a temperature of 176° F.

HOPKINS' CROW BRAND PYRETHRUM POWDER
Milled to any degree of fineness

J. L. HOPKINS & CO.

IMPORTERS • MILLERS • MANUFACTURERS

220 Broadway **New York**

Pests

and Their CONTROL

COOPERATING WITH NATIONAL PEST CONTROL ASSOCIATION

Exterminators, Fumigators, Termite Control Operators, Entomologists, Insecticide and Supply Manufacturers

AL COSSETTA, *Editor*
D. E. RECK, *Associate Editor*

MAX ROSENTHAL, *National Advertising Rep.*
126 Lexington Ave., N. Y. City, Phone Mu. 4-9000

PUBLICATION OFFICE, 512 EAST 14th ST., KANSAS CITY, MO.

Vol. 11. No. 5 | MAY, 1943 | ESTABLISHED 1933

NATIONAL PEST CONTROL ASSOCIATION, INC.

OFFICERS AND DIRECTORS
October 1942—October 1943

PRESIDENT
F. E. Bohman, 173 Church St.....Hartford, Conn.

REGIONAL VICE PRESIDENTS
George R. Elliott, 58 Front St.....Worcester, Mass.
L. A. McKenna, 1603 St. Clair Ave.....Cleveland, Ohio
William Hogan, 150 E. Glenarm St.....Pasadena, Calif.
Max J. Levy, 2399 University Ave. W.....St. Paul, Minn.
Otto Orkin, 315 Peachtree St.....Atlanta, Ga.
Jerome Howell, 2403 Main St.....Houston, Tex.

SECRETARY
William O. Buettner, 3019 Ft. Hamilton P'kway....Brooklyn, N. Y.

TREASURER
Robert C. Yeager, 100 East Court St.....Cincinnati, Ohio

DIRECTORS
Three Years—1942-1945
Bert Lewis, 502 Rex St.....Muncie, Ind.
E. N. Goldey, 263 West 54th St.....New York, N. Y.
Charles Denny, 455 Paul Brown Bldg.....St. Louis, Mo.
William McCain, 11 St. Marys St.....Dayton, Ohio
Louis Gatto, 1106—9th St.....Beaver Falls, Pa.
V. H. Montgomery, 210 Post St.....San Francisco, Calif.
Mrs. Ada Williams, 1708 E. Central Ave.....Albuquerque, N. M.

DIRECTORS
Two Years—1942-1944
John W. Anderson, Post Office Box 1084.....Corpus Christi, Tex.
Ernest G. Mills, 205 Oak St.....San Francisco, Calif.
Morton S. Prescott, 129 S. Laflin St.....Chicago, Ill.
J. Harvey Sturgeon, 225 W. Breckinridge St.....Louisville Ky.
Ray V. Bechtel, 2084 W. Forest Ave.....Detroit, Mich.
Martin Meyer, 213 S. 10th St.....Philadelphia, Pa.
Mrs. R. W. Laing, 7700 Carnegie Ave.....Cleveland, Ohio

DIRECTORS
One Year—1942-1943
Stanley Justice, 244 S. Third St.....Columbus, Ohio
Harold Jennings, 216 W. Jackson Blvd.....Chicago, Ill.
J. Edwin Sameth, 1060 Broad St.....Newark, N. J.
Charles Mollard, 435 N. Milpas St.....Santa Barbara, Calif.
E. D. Smith, 3470 West 1st St.....Los Angeles, Calif.
Glenn Burnett, 92 Plaza Way, S. W.....Atlanta, Ga.
Henry Turrie, 512 West North Ave.....Milwaukee, Wisc.
Sidney Wimmer, 143 West 53rd St.....New York, N. Y.

CANADIAN REPRESENTATIVE
P. Henry Maheu, 3128 Masson St.....Montreal, P.Q., Canada

PAST PRESIDENTS
William O. Buettner, 3019 Ft. Hamilton P'kway....Brooklyn, N. Y.
Thomas C. Raley, 1135 Pine St.....St. Louis, Mo.
C. Norman Dold, 6 East Lake St.....Chicago, Ill.
Bartlett W. Eldredge, 118 Calvary St.....Waltham, Mass.
H. K. Steckel, 113 West Rich St.....Columbus, Ohio
H. G. Irving Sameth, 200 Fifth Ave.....New York, N. Y.
Walter S. McCloud, 612 N. Michigan Ave.....Chicago, Ill.
L. R. Alderman, 1811 E. Walnut St.....Pasadena, Calif.
P. Calvert Cissel, 928 Eye St., N. W.....Washington, D. C.

MEMBERSHIP

Three classes of membership: Active, Associated and Allied. ACTIVE MEMBERSHIP includes all firms engaged in any type of Pest Control operations (general extermination, fumigation, termite control, moth proofing) and dues are $15.00 per year. ASSOCIATE MEMBERSHIP includes branch offices of Active members and yearly dues are $10.00. ALLIED MEMBERSHIP includes manufacturers and supply houses.

STATEMENT

The National Association appreciates the co-operation given by way of publicity. The Association is not responsible for articles published unless credited to the Association. The list of officers and directors is published for informational purposes only.

For further details, communicate with

WILLIAM O. BUETTNER, Secretary
3019 Fort Hamilton Parkway **Brooklyn, New York**

CONTENTS

"Contributed articles in this publication do not necessarily reflect the opinions of the editors. The editors invite discussions, comments and all types of literary material pertaining to pest control and pests from any person interested in the advancement of the field."

Editorial 4-5

Legislation Relating To Rodents 6
By Ernest M. Mills

Insects and Rodents In Relation to Public Health In War Time 8
By Dr. Vlado A. Getting

Definition of the Insecta or Hexapoda 12
By G. Chagnon

U. S. Insecticide Color Law Needed, Says Cox 19

Effects of High Temperature on Several Household and Storage Grain Pests 25
By E. E. Kenaga and F. W. Fletcher

Additional Patents Relating to Pest Control 26
By Dr. R. C. Roark

News From Washington 26

What's New in Pest Control—Personals 27

Montreal Memos 28
(From One Yank's Notebook)

Local Organization News 29

Write For These Booklets 30

Published monthly by PESTS, 512 East 14th Street, Kansas City, Missouri. Subscription rate in the United States and Possessions $3.00 per year; Foreign $3.50 per year; Single Copies 25 cents; Bundles of 25 Copies $5.00. Publishers not responsible for unsolicited manuscripts. No manuscripts will be returned. All advertising copy and contributions must be in our hands by the 15th of the preceding month of the issue in which they are to appear. Three weeks' advance notice necessary for change of address. Both old and new address must be given.

EDITORIAL

Merwyn Horwitz

IN THE untimely death of Merwyn Horwitz, owner of the Excelsior Exterminating & Mfg. Co., Inc., N. Y., the Industry has sustained a severe loss. Only 48, Mr. Horwitz, charter member of the NYPCA and NPCA, passed away on April 26 of a heart attack.

Ever co-operative in accelerating the best interests of the Industry, he served with competence and sincerity on important Industry committees. His broad-guaged, constructive and tolerant outlook earned for him not only the respect of the fraternity but a host of friends within and without the Industry.

Patriotic to the core, a Mason, and busy individual that he was, Mr. Horwitz, nevertheless, found the time to contribute with unflagging energy to the war effort, acting as a member of the Rationing Board, as a Senior Sector Warden and as a collector and contributor to funds for the Red Cross and other charitable institutions.

He was a devotee of the outdoors, with boating (he owned a comfortable one) and fishing his pet diversions.

Funeral services were held from the family home at 33-44-154 Street, Flushing, N. Y. Present, representing the Industry, were: E. N. Goldey, N. N. Sameth, William Shrimplin, C. Schwimmer, Herbert Mayer, Sidney Wimmer, Arthur O'Connor, Joseph Hogan, William O. Buettner.

To the surviving members of his family, his widow, Mrs. Verona Horwitz, his daughter, Mrs. Stefan M. Rohdie, his daughter, Helen, and his son, Harry, we extend our deepest sympathy on their irreparable loss. He will be missed by all who knew him.

Dr. Vlado A. Getting Appointed

DR. VLADO A. GETTING, who served as Worcester's Public Health Commissioner for 14 months, was moved up to the important post of Massachusetts State Commissioner of Public Health by Governor Saltonsall, on April 17, to succeed Dr. Paul J. Jakmauh, whose term expired. Only 33, Dr. Getting, who, besides his Harvard doctorate in medicine, holds several other degrees, including that of Doctor of Public Health, and has written many technical papers and professional reports in connection with his public health research, is the youngest ever to hold the state office. Recognizing pest control for the factor that it is in matters of public health and the PCO for the key person that he is, to effectuate it, Dr. Getting accepted an invitation to participate in the recent Eastern Pest Control Operators' Conference at Amherst, Mass.

Congratulations! Our good wishes and high expectations go with Dr. Getting. It is our hope, also, that he will find time from his stepped-up duties to make available, at other Industry meetings, the benefit of his exceptional knowledge and experience, particularly on wartime derivative control problems.

Driving Home Ethics

By JOHN G. VOGEL

DID YOU READ that article by Mr. A. M. W. Carter, Director of Pesticides for the Dominion of Canada, published in the February 1943 issue of "Pests" under the heading of "Ethics in Pest Control?" If you didn't, you must. It is easy reading, short and significant. It is a challenge to the Pest Control Industry of Canada and also applies to the United States, submitted by a government official whose judgment cannot be questioned. It is an eye-opener to every PCO who still has not recognized the value of organization and the benefits to be derived from a progressive trade association.

Mr. Pest Control Operator, do you remember ten years ago or even five years ago when the integrity of the "exterminator" was constantly belittled and criticised, in your home town, and mine? Why was that? Mr. Carter gives the answer and he does it without mincing words. Don't we know how right you are, Mr. Carter, when we apply your words to us—ten years ago: "Your Industry is still in a somewhat primitive condition—there are too many operators who are little better than the ignorant members of the public," and you are right, too, when you say that it is much better to "improve such operators' methods of doing business rather than to try to get rid of such men", for the simple reason that very soon other men of the same calibre would take their places. Human instincts cannot be "exterminated", but they can be "controlled", and, as you further state, "that can be accomplished only by organizing".

As present Chairman of the Committee on Ethics of the National Pest Control Association, I pay tribute to the wisdom and human foresight of the preceding Committees on Ethics who recognized that our Pest Control Industry, to succeed, must charter for itself a well-defined course of fair dealing. Those men have laid the ground work by drafting our "Code of Ethics" without which we could never have functioned. This, our "PCO Charter", was one of the first and most important contributions to the membership as well as to the public at large. We also realize that man's mind is limited and that our Code can never be broad enough to encompass the spirit of our intentions and that, therefore, it may be easily violated in its spirit, even though it is observed to the letter, and vice versa. Opinions differ and always will differ or the world would become stagnant, and so we strive constantly to extend the scope of our "Charter" in harmony with the trend of modern science and modern spirit.

The time has passed when commerce and industry were considered exempt from the stricter dictates of

moral law or, at least, were looked upon as an indefensible and inevitable anomaly.

There is still, of course, a regrettable vagueness as to the meaning of ethics, and the "business is business" attitude has not yet completely disappeared—our Code of Ethics notwithstanding. But if we don't make "rules of conduct" for and among ourselves, somebody else will—under the ever increasing pressure of Federal, State and Municipal Agencies. Witness the many regulations, restrictions, ordinances and laws already in force, especially for fumigating operations and termite control. We may as well fall in line of our own accord, which can best be accomplished through an impartial and constructive common coordinator, such as the National Pest Control Association, if it embraces all earnest members of the Industry.

Moral codes are always and everywhere identical in their goal, which is to regulate the nature and laws of the actions of intelligent beings, whether they refer to the private sphere or to business life.

If ethics today are recognized as a human duty, why then does Mr. Carter put special stress on the importance of good business ethics in Pest Control? It is because we deal not in merchandise, but in intangibles, in a service the intricacies of which are not familiar to the public, and leave the field wide open for chiselers, itinerants and unscrupulous operators who can and will take advantage of an ignorant public.

None of us is pure, and in our struggle for success, for existence, we are easily drawn into a steadily narrowing circle, of which we and our own individual interests and purposes become the center, strangling our nobler and more generous impulses and sowing the seeds of dissension. We must be on constant guard lest we shut off our broader views of humanity.

Strong ethical self-discipline becomes an absolute "must" in our Industry which makes claims, and, for the most part, just claims of protecting public health and welfare, today more than ever. We cannot profess these claims unless we are prepared to accept their obligations and responsibilities. Whether we consider ourselves a trade or a scientific profession or both, it is incongruous to declare that the communal welfare is the dominating purpose of our business when we pursue it merely for financial and commercial advantages without giving full consideration to the expectations of the public and the right of our competitors, who endeavor to render the same conscious and conscientious service to humanity, and who, therefore, are worthy the respect and interest of every other Pest Control Operator.

Our "Common Co-ordinator", the National Association, is an equalizer as well as a stabilizer because it lifts the smaller operator to the same level of public acceptance enjoyed by most of the larger firms, and it gives him access to the sources of knowledge and experience possessed by his fellow operators, large and small. It is obvious, therefore, that, the smaller and less experienced a Pest Control Operator is, the greater proportionately he will benefit in strengthening his own individual business by virtue of the co-ordinated efforts of the National Association. It also gives him an outlet for expression, exchange of experiences and perhaps active participation—proportioned to his talents—in the affairs of the Pest Control Industry, by serving on committees, offices, etc., for the common good of all. Legitimate and recognized competition is the life-blood of our Industry. Without it there would be no "Industry".

From a purely human standpoint, nobody can consider himself successful because he accumulates wealth merely through shrewdness and sharp trading. Such is not the measure of ability, for it betrays a lack of good judgment and cannot possibly create enjoyment and happiness—not even pardonable pride. And what is this life worth unless we succeed in gaining the respect of our fellow men and perhaps a few friendships, and most of all, happiness and genuine satisfaction in serving mankind in the larger sense.

Thank you, Mr. A. M. W. Carter, for giving such splendid recognition to the achievements of the National Pest Control Association which, under a strong leadership of high-spirited men, has taken long strides toward an ever growing consciousness of **"Good Business Ethics in Pest Control."**

CODE OF ETHICS

(A) Relation of Member to Public: The Member in his advertisements or other solicitations of business shall not use tricky, fraudulent, or misleading wording or methods.

(B) Relation of Member to Client: The Member shall thoroughly analyze the requirements of his clients and shall conscientiously recommend the means best suited for the clients' needs.

(C) Professional Services: The Member upon accepting a contract or service agreement shall render skilled, intelligent, and conscientious service.

(D) Relations of Member to Competitor: The Member shall not publicly criticize the business or private affairs of a competitor.

(E) Relation of Member to Association: The Member shall be loyal to the principles of his Association and active in its advancement.

This is our Code of Ethics. It sounds almost childishly simple. It is not simple in the sense of easy achievement or even limited application. It is simple only in the sense that it reflects a concerted movement—growing with the growth of the membership—to establish and strengthen the bonds of friendship among men all working in the same direction. Its influence cannot help but radiate, first upon the membership, then upon the public—the spirit of genuine service.

Insecticide Color Law

WITH THE Pittsburgh, Pa., Salem, Ore., and other fluoride poisoning tragedies still fresh in mind, and due basically to carelessness and use of untinted or white powdered poisonous insecticides, it was not only inevitable but highly desirable that remedial preventive legislation be enacted. To that end, Senate Bill 897, to provide for the protective coloration of white powdered poisonous insecticides, was introduced on March 19 by Senator Bailey to amend the Insecticide Act of 1910. After two readings the bill was referred to the "Committee on Commerce". Its text follows:

(Continued on page 11)

Legislation Relating To Rodents

ERNEST M. MILLS, *U. S. Fish and Wildlife Service*
New Brunswick, N. J.

EDITOR'S NOTES:—This article might be considered as Part II on "Legislation Relating to Rodents" in that the August, 1942, issue of Pests discussed the high lights of the laws or ordinances that directly or indirectly apply to the rodent problem. The following article relates to rodent control products and licensing of pest control operators.

THIS article concludes the compilation of legislative material, particularly relative to rodent control products and the licensing of pest control operators. It will be noted that the sub-heads are divided into Federal, State, and city or local laws and regulations. As in the previous compilation, a complete summary of all such legislation will not be given, but only the more pertinent or representative laws will be quoted. No attempt will be made to evaluate these laws and regulations, or to give the background or reasons for their enactment.

Rodent Control Products

As the pest control operator or other person finds rodent control products useful to eliminate rodents, either through servicing or by direct selling, he should be mindful of the various laws and regulations pertaining to advertising, labeling, sale, delivery, and prohibited use of certain products.

Standards

It appears that there are no Federal, State, city or local laws or regulations that require rodent control products to meet any given standard toxicity and uniformity. Efforts have been made to obtain Federal legislation applicable to rodent products as has been done with insecticides but to date these efforts have been unsuccessful.

Advertising

The Federal government has jurisdiction over products in interstate commerce under the Federal Trade Commission Act, Public No. 203—63d Congress as amended by Public No. 447—75th Congress. Excerpts of this Act follow:

Sec. 5. (a) "Unfair methods of competition in commerce, and unfair or deceptive acts or practices in commerce, are hereby declared unlawful.

Sec. 12. (a) "It shall be unlawful for any person, partnership, or corporation to disseminate, or cause to be disseminated, any false advertisement —(1) By United States mails, or in commerce by any means,—(2) By any means, for the purpose of inducing, or which is likely to induce, directly or indirectly, the purchase in commerce of foods, drugs, devices, or cosmetics. (b) The dissemination or the causing to be disseminated of any false advertising within the provisions of subsection (a) of this section shall be an unfair or deceptive act or practice in commerce within the meaning of section 5.

Sec. 15. "For the purposes of sections 12, 13, and 14—(a) The term "false advertisement" means an advertisement, other than labeling, which is misleading in a material respect; and in determining whether any advertisement is misleading, there shall be taken into account (among other things) not only representations made or suggested by statement, word, design, device, sound, or any combination thereof, but also the extent to which the advertisement fails to reveal facts material in the light of such representations or material with respect to consequences which may result from the use of the commodity to which the advertisement relates under the conditions prescribed in said advertisement, or under such conditions as are customary or usual.—(d) The term "drug" means (3) articles (other than food) intended to affect the structure or any function of the body of man or other animals;—."

The Advertising Law of New York State will serve as an example of state legislation. Section 421 of the Penal Law follows: "Any person, firm, corporation and association, or agent or employee thereof who, with intent to sell or in any wise dispose or merchandise,—or anything offered by such person,—indirectly or directly, to the public for sale or distribution, or intent to increase the consumption thereof, or to induce the public in any manner to enter into any obligation relating thereto,—, or an interest therein, makes, publishes, disseminates, circulates, or places before the public, or causes, directly or indirectly, to be made, published, disseminated, circulated, or placed before the public, in this State, in a newspaper, magazine or other publication, in the form of a book, notice, circular, pamphlet, letter, handbill, poster, bill sign, placard, card, label, or tag, or in any other way, and advertisement, announcement, or statement of any sort regarding merchandise,—, service, or anything so offered to the public which advertisement contains any assertion, representation or statement of fact which is untrue, deceptive or misleading, shall be guilty of a misdemeanor." (In effect, Sept. 1, 1929.)

Labeling

As manufacturers and pest control operators sell certain rodent control products to the public, the following excerpts of typical State Laws are given:

University of the State of New York, Handbook 11, Sec. 1366, 1, "It shall be unlawful for any person to sell at retail or to furnish any of the poisons of schedules A and B without affixing or causing to be affixed to the bottle, box, vessel or package, a label with the name of the article and the word "poison" distinctly shown and with the name and place of business of the seller all printed in red ink together with the name of such poisons printed thereupon in plain, legible characters." (Schedule A lists arsenic, hydrocyanic acid, strychnine and all other poisonous vegetable alkaloids and their salts. Schedule B lists, for example, arsenical solutions, salts of zinc.)

Certain cities specify precise phraseology relating to labeling. The regulations issued by the Boards of Health of Cleveland, Ohio, Newark, N. J., and New York, N. Y. read about the same. The text from Cleveland is given: Sec. 975—6 (a) "No person shall sell or give away or distribute in the City of Cleveland any poisonous substance as an exterminatant or insecticide unless the container bears a label legibly and conspicuously printed with the word, "POISON" and the symbol of the skull and crossbones in red ink followed with the words "CAUTION"—This exterminatant or insecticide contains (State the name of the poison), a deadly poison," together with the antidote therefor and the name and address of the manufacturer or packer, and the words "poison," "caution" and "antidote" in block type of a larger size than the other wording, viz:—."

Label Copyrighting

As some manufacturers of rat control products may desire to register

their labels with the Copyright Office, a brief summary of these requirements will be given. The full text of Circular No. 46, "Registration of Commercial Prints and Labels in the Copyrights Office" may be obtained from the Register of Copyrights, Library of Congress, Washington, D. C. Section 2 of this circular reads, "The term "label" may be defined as an artistic and/or literary work, impressed or stamped directly upon the article of merchandise or upon a piece of paper or other material to be attached in any manner to articles of merchandise or to bottles, boxes, or other containers thereof, to indicate the nature of the goods. The print or label must bear the word or words to serve as an identifying title." Sections 3, 4, and 5, of this circular discuss the method of publication, filing an application for a copyright, fees, and renewals. It costs $6 to register a label for 28 years and such a copyright may be renewed.

Closed Packages

The State of California has what is known as the "closed package law." The Agricultural Code of California, Division 5, Chapter 7, Article 3, Section 1065 reads, "Sales of economic poisons in any other than the registrant's sealed and closed container or package is prohibited. The director, in his discretion, in accordance with regulations prescribed by him, may authorize sales of economic poisons to be made out of registrant's opened but properly labeled lot, container or package.—." (See section on Registration.)

Registration

California is one state requiring persons or manufacturers, etc. who sell economic poisons to be registered or licensed. As the text of each regulation is rather long, only the first part of the section will be quoted from the Agricultural Code of California, Division 5, Chapter 7, Article 3, Section 1071, "Every manufacturer of, importer of, or dealer in any economic poison, except dealers or agents selling economic poison which has been registered by the manufacturer or wholesaler thereof and persons selling raw material to manufacturers of economic poisons, before the same is offered for sale shall obtain a license from the department. The annual fee is fifty dollars ($50), payable to the director. —(2) licensed pest control operators manufacturing an economic poison that does not exceed a total retail value of five hundred dollars ($500) per annum, that is not sold to the general public and is intended to be sold only by being used in connection with their own pest control service work, which intent must be expressed on the label of said economic poison, shall pay an annual license fee of ten dollars ($10) to the director."

In connection with the sale of a poison to the public, the matter of recording the sale has resulted in some state regulations. It is common practice for the pharmacist to record the name and address of the person receiving certain poisons; in many cases the druggist is simply following their state laws. An example of this legislation is given from the University of the State of New York, Handbook 11, Art. 51, Sec. 1366, part 3, "Register. Every person who disposes or sells at retail or furnishes any poisons included in schedule A shall before delivering the same enter in a book kept for that purpose the date of sale, the name and address of the purchasers, the name and quantity of the poison, the purpose for which it is purchased and the name of the dispenser. The poison register must be always open for inspection by the proper authorities and must be preserved for at least five years after the last entry. He shall not deliver any of the poisons of schedule A or schedule B until he has satisfied himself that the purchaser is aware of its poisonous character and that the poison is to be used for a legitimate purpose.—."

A poison is defined (Sec. 1350, 17) as "Poisons" where not otherwise limited, means any drug, chemical or preparation likely to be destructive to adult human life in quantities of sixty grains or less." Schedule A (Sec. 1370-d) contains such poisons as arsenic, strychnine and all other poisonous vegetable alkaloids and their salts. Schedule B contains such poisons as arsenical solutions, salts of zinc, or any drug, chemical or preparation which is liable to be destructive to adult human life in quantities of sixty grains or less. Exceptions apply as follows: (Sec. 1367, 2) "This article shall not apply: (a) To the sale of paris green, white hellebore or other insecticides."

Restricted Use and Sales

There are regulations in some states and cities restricting or prohibiting the use, storage, or sale of certain rodent control products. These regulations will be divided into five sections, namely, (1) restricted use or storage on certain premises, (2) posting or signs, (3) sale of viruses, (4) sale of thallium, and (5) accidental use.

1. The U. S. Bureau of Animal Industry restricts the use of poisons in Federally inspected meat packing establishments to red squill and barium carbonate. (See quotation in part 1 of this article on legislation.)

The following regulations apply chiefly to food establishments to prevent contamination of foods by poisons either by use of the poisons or by the storage of poisons.

New York State Sanitary Code, Chapter XIV, reg. 8—Poisons Materials: "The storage, keeping, or use of any insecticide, exterminators or other substance containing fluoride or other poison in refrigerators, on shelves, or in other places where they may contaminate foods or beverages is prohibited."

Westchester County, N. Y. County Sanitary Code, Article 3, Sec. 1, m, reads, "No substance containing any cyanide, fluoride or other poison shall be kept or used as an insecticide or exterminator in any place where food or drink is exposed for sale, preparation, holding, or dispensing or in such manner as to contaminate such food or drink."

New York, N. Y. Health Dept. Sanitary Code, Sec. 104 (c), reads, "No person shall use, sprinkle or allow to remain sprinkled in a food establishment any poisonous exterminator or insecticide. However, an exterminator or insecticide containing wholly or in part any fluoride, colored nile blue or pale nile blue or microcline green, may be used and sprinkled on the floors of the food establishment, and on the walls or other parts thereof provided said exterminator or insecticide is not placed in refrigerators, on shelves or other places where it can come in contact with exposed food."

New York, N. Y. Health Dept. Sanitary Code, Sec. 141 reads, "No person, being the owner, lessee, manager, or in charge of any place in which food or drink is produced, manufactured, prepared, packed, stored, distributed, offered for sale, or sold shall therein or thereat, offer or have, for food, or drink, or to be eaten or drunk, any poisonous, deleterious, or unwholesome substance, or allow anything to be done or to occur, therein or thereat, dangerous to life or prejudicial to health."

2. There is one county having regulations pertaining to the posting of signs while an exterminator or insecticide is in use. Westchester County, N. Y. County Sanitary Code, Article 3, Sec. 1, m, reads, "The handling, storage or use of any poisonous substance as an exterminator or insecticide in any place where food or drink is served, sold, processed, kept or offered for sale is prohibited unless the container is labeled as required by the state sanitary code and is kept readily available upon the premises until the exterminator or insecticide has been completely removed, or unless a clearly legible sign bearing information identical to the information required on the label of the container is posted conspicuously in every room where such exterminator or insecticide is in use." (Adopted Dec. 17, 1942, effective Feb. 1, 1943.) The following interpretation or exemption of the above section has been made:

(Continued on Page 15)

Insects and Rodents In Relation to Public Health In War Time

By DR. VLADO A. GETTING, *Commissioner of Health, Worcester, Mass., and Assistant in Epidemiology and Preventive Medicine, Harvard Medical School and School of Public Health; Formerly District Health Officer Mass. Dept. of Public Health, Technical Director — Mosquito Survey Mass. Dept. Public Health, etc.*

AFTER December 7th, 1941, all Americans became conscious of war—for Japan had suddenly burst America's bubble of isolationism. Yes, many of our citizens believed we were self-sufficient and apart from the rest of the world, safe from the conflagration which was charring the rest of the world. Public health [1] and military officials, however, have been deeply concerned for many years, fearful of the involvement of the United States.

Since time immemorial wars have been attended by pestilence and death. Through all history, famine and disease are constant companions of war.

Medical History of Wars

The history of wars prior to the twentieth century is characterized by accounts of great epidemics of typhus fever, smallpox, typhoid fever, dysentery, malaria, cholera and bubonic plague. In modern warfare, influenza, meningococcus meningitis, venereal diseases, insect-borne diseases, and other respiratory diseases, are of outstanding importance. While historical pestilences remain as possible dangers, they are controlled by the continuous application of the principles of sanitation and epidemiology, and it is unlikely that they will again be responsible for most of the mortality of war.

Under war conditions, [2] many of the safeguards of the health of both the military and civilian population are abandoned. The crowding between individuals, the primitive environmental conditions and the lack of personal hygiene are all conducive to the spread of infectious diseases. The concentration and movement of large bodies of population — civilian and military—and the limitless hardships, with fatigue, general malnutrition, famine and exposure; and the lack of medical care experienced by civilians and soldiers alike, provide the fuses for the explosion of wide-spread epidemics. More soldiers have invariably been killed by infectious diseases than by bullets in all wars prior to the Franco-Prussian War of 1870, when the German Army reported an excess of deaths from battle. In the Russo-Japanese War of 1904, both sides maintained the high proportion of deaths from wounds. In spite of the toll of influenza, the A.E.F. of 1917-1918 reported fewer deaths from sickness than from battle; although for the entire United States Army, at home and abroad, the deaths from disease were more numerous.

World War of 1914-1918

During and after the war of 1914-1918, [3] the common war diseases were highly prevalent in Eastern Europe. There was an epidemic of typhus fever throughout Russia, Poland and Serbia. Fortunately, typhus did not spread into Western Europe. The common communicable diseases did not constitute a major problem. Overhadowing all other outbreaks was the influenza pandemic. The mortality from influenza and pneumonia recalled the ravages of the "Black Death of medieval European history. Meningococcus meningitis reached a new high and tuberculosis and venereal diseases increased and caused much illness. Malaria, which had disappeared from most of Europe, returned to central, eastern and northern Europe, to ravage the population.

In the United States Army, influenza, venereal diseases, mumps and measles were the most frequent causes of absence from duty. Influenza, tuberculosis, measles and meningococcus meningitis were the leading causes of death. A most noteworthy fact is that the Army in continental United States had generally higher rates for admission and days lost from duty for infectious diseases than did the forces abroad. Likewise, the Navy of the United States suffered from communicable diseases with a higher incidence in training camps than on ship-board. The explanation of this phenomenon is that the Navy and Army personnel in this country were newly organized and, therefore, had a lower group resistance to infectious diseases; and second, they were more exposed to infections from civilian population than were the troops in Europe. Conversely, the danger of spread of infection from the military to the civilians was enhanced.

The Present War

In the present war, influenza, meningococcus meningitis, and tuberculosis are again showing increased incidence in the civilian population both on the continent and in the British Isles. Typhus fever and bacillary dysentery are of epidemic proportions in Eastern Europe and will no doubt, achieve high proportions during the coming winter. In Great Britain the evacuation of school children did not result in an expected increase in the common communicable diseases. In continental Europe malnutrition, fatigue and lack of adequate shelter are the principal causes for the increase of illness. The hazards of infection have been intensified by the crowding in bomb shelters. Scabies, impetigo and lice infestation are acute problems. Not only influenza, meningococcus meningitis and tuberculosis; but also para-typhoid fever and bacillary dysentery showed increases in incidence beginning in 1940. The incidence of typhus fever which had declined for the past ten years has again been increasing in Poland, Russia and Roumania, which are the principle European foci of these diseases. In 1938 there were 7,000 cases of typhus reported from Europe, exclusive of Russia. During the winter of 1939-1940, there was an increase of typhus in eastern Europe and an extension of the diseases into Germany, France and Spain. During the winter of 1940 and 1941, typhus fever extended into nearly all portions of continental Europe and also Turkey and northern Africa. It is expected that this winter typhus will play a much more important role.

Thus far I have given you a background of infectious diseases in war time and tried to point out the importance of the two groups of diseases which we are to discuss this afternoon; namely: those diseases which are transmitted by insects and rodents.

Man has, to a large degree, been able to control those infections for which he has been able to develop an artificial immunity by inoculation, as smallpox and typhoid fever and those diseases against which isolation

is adequate. However, under wartime conditions the control of infectious diseases is of military importance only (insofar) as these diseases interfere with the task assigned to any military unit, and, therefore, the main purpose of infectious disease control during war time is guided by the principle of keeping as many men physically fit and in fighting trim as possible. In other words, the importance of a disease from a military point of view and the value of disease control measures are determined in war time by their effect or non-effect of the available fighting strength of a force. The two groups of diseases which we are to discuss today are most difficult to control under battle conditions. Military forces cannot avoid areas which are infested with disease-carrying insects. For example, malaria, which is spread by the anopheles mosquito, is one of the major forces which defeated the Americans on Bataan. Rodents are also, to a large measure, an uncontrollable factor in the spread of disease under military conditions. Since rats and other rodents are of importance in the spread of disease principally because they are the hosts of insects which transmit the disease, we will first consider insect-borne diseases and their epidemiological background and later return to the diseases concerned with rodents.

Insect-Borne Diseases

A disease is classified as insect-borne when a blood sucking insect is the sole or the usual agent by which the infecting organisms are transmitted from one patient to another. This transmission may be:

1. From man thru vector to man.
2. From animal thru vector to man.
3. From animal thru vector to animal.
4. From man thru vector to animal.

The disease may have a wide host selectivity and the vector may spread the disease from one genus of animals to another. On the other hand, many insects feed only on certain very closely related species of the same animal; other vectors are not as finicky about the type of blood they suck. Many insects prefer certain hosts and will fly many miles to obtain this favorite blood, rather than bite some other species which may be near by. Occasionally, this zoophilic deviation of the insect vector can be used as a control measure in malaria. The importation of cattle may deviate the mosquitoes from man and thereby reduce the incidence of bites of man.

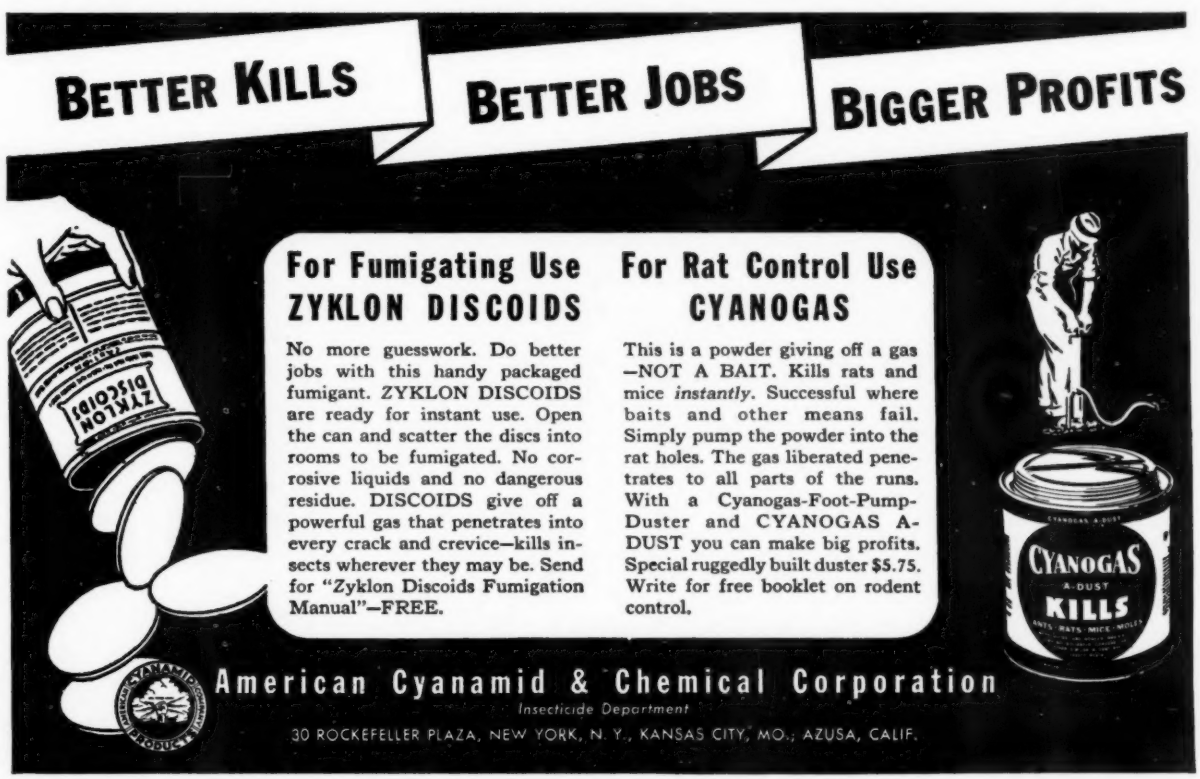
An insect-borne disease may be transmitted by only one genus or, in some instances, by only certain species or merely one species of insect. Other insect-borne diseases are spread by several different insects, entirely unrelated and of different genera. Dengue, for example, is transmitted naturally by only two species of Aedes mosquitoes: Aedes egypti and Aedes albopictus. Malaria is transmitted by some twenty species of **Anopheles** mosquitoes. Relapsing fevers are transmitted by both lice and ticks; typhus fever by both lice and fleas.

Classification of Vectors

Before proceeding further, I wish to point out that thus far I have been using the word "insect" rather generally. Many so-called "insect-borne" diseases are not transmitted by insects but by other genera. The true insect is a hexapod and belongs to the class **Insecta,** such as the mosquito, fly, bed bug and the louse. Other insect-borne diseases are transmitted by the class of **Arachnida,** which are eight-legged creatures, such as mites and ticks. A more appropriate term to include both the insects and arachnids is **Arthropoda** — which is the phylum of animals with jointed-legs.

The class **Insecta** is composed of about twenty orders, of which five are incriminated directly or indirectly in the transmission of disease. These five orders are:

Diptera (flies and mosquitoes)
Anoplura (lice)
Siphonaptera (fleas)


BETTER KILLS
BETTER JOBS
BIGGER PROFITS
ZYKLON DISCOIDS
For Fumigating Use
ZYKLON DISCOIDS
No more guesswork. Do better jobs with this handy packaged fumigant. ZYKLON DISCOIDS are ready for instant use. Open the can and scatter the discs into rooms to be fumigated. No corrosive liquids and no dangerous residue. DISCOIDS give off a powerful gas that penetrates into every crack and crevice—kills insects wherever they may be. Send for "Zyklon Discoids Fumigation Manual"—FREE.
For Rat Control Use
CYANOGAS
This is a powder giving off a gas —NOT A BAIT. Kills rats and mice instantly. Successful where baits and other means fail. Simply pump the powder into the rat holes. The gas liberated penetrates to all parts of the runs. With a Cyanogas-Foot-Pump-Duster and CYANOGAS A-DUST you can make big profits. Special ruggedly built duster $5.75. Write for free booklet on rodent control.
CYANOGAS
A-DUST
KILLS
American Cyanamid & Chemical Corporation
Insecticide Department
30 ROCKEFELLER PLAZA, NEW YORK, N. Y., KANSAS CITY, MO., AZUSA, CALIF.

Hemiptera (bugs)
Orthoptera (roaches)

To these may be added a sixth order, **Hymenoptera** (wasps, bees and ants), some of which bite or sting man and are a source of discomfort. Perhaps some future research may relate these insects to disease transmission.

The class **Arachnida** is composed of eleven orders of which only one, **Acarina,** comprised of ticks and mites, is known to transmit disease. The orders, **Scorpionida** (scorpions) and **Araneida** (spiders) cause discomfort by biting man but have not been incriminated as vectors of disease.

Manner of Transmission of Disease by Vector Infection of Vector

The vector of a disease is primarily infected by biting a person or animal who is a blood-carrier of the disease in question, whereby the insect ingests the blood containing the infecting organisms. In certain of the insect-borne diseases, such as Rocky Mountain Spotted Fever, the infective-agent is transmitted by the primary insect host through the egg stage to succeeding generations. Occasionally the infective-agent is passed from one insect to another during copulation. One or more of these methods may prevail in the case of the disease in question. Usually, those diseases where the infective-agent is passed from one generation to another in the vector, the disease is more persistant or longer-lived. The infective-agent is not fatal to the vector and there is evidence that this interrelation of the infective-agent and the primary insect-host is sufficient to propagate the disease without the intervention of another host. This apparent symbiosis or survival of the infective-agent in the insect-host and its transmission to subsequent generations of the insect-host indicates that this is an old or usual disease of that insect and that the infection of man is accidental and man is a true secondary host—unnecessary for the continued existance of that disease. These conditions are illustrated by the tick, **Dermacentor andersoni,** and the **Rickettsia** of Rocky Mountain Spotted Fever.

Infection of Host

The infective-agent is transmitted usually to man or some other animal as a result of biting or attempted biting by the infected insect-host. In some diseases, the infected insect injects saliva into the tissue in order to maintain the blood fluid, and in so doing, the malaria plasmodium are introduced into the bitten victim. Occasionally, the regurgitation of stomach contents may be the manner of infecting the bitten person; it is in this manner that fleas spread the bacteria of plague. In other instances, the surface of the skin is contaminated by the feces or glandular secretions of the infected insect, or by the infected material of an insect which is crushed on the skin, when the person kills the insect as it bites. This infected material reaches the blood of the bitten person by being inoculated into the bite wound or through abrasions made by scratching or rubbing the bitten area. The infective agents of some of the insect-borne diseases, notably the bacteria of plague and the spirochetes of relapsing fever, will pass directly through the unbroken skin.

Biological Transmission

Some of the infective organisms which cause insect-borne disease in man undergo a stage of development in the body of the insect host before they can be transmitted to the human host. In such a disease both the insect host and man are necessary for the survival of the disease and the absence of either results in the control or disappearance of the disease from the affected area. Control of this type of insect-borne disease is more feasible than of the type where the infective agent is passed through eggs from one generation of insect hosts to the next. Malaria and filariasis are examples of diseases which undergo this type of biological development. The time required for the development of the parasite in the insect host constitutes the extrinsic period of incubation. This extrinsic incubation varies in length for different organisms, but is fairly constant for each organism, although influenced by temperature changes; colder weather lengthens the extrinsic period of incubation.

The life cycle of certain of the infective agents which undergo biological development, includes a sexual and an asexual phase. The host in which the sexual phase occurs is called the **definitive host** while the one in which the asexual phase is passed is known as the **intermediate** host. Either the insect-vector or the human-host may serve as a **definitive** or an **intermediate host.** In malaria, the sexual phase of the plasmodium occurs in the **Anopheles** mosquito, which is the definitive host and man is the intermediate host. In filariasis, on the other hand, of which the infective agent is **Wuchereria ban crofti,** man is the definitive host with the sexual cycle and the mosquito with the asexual cycle is the intermediate host.

An essential consideration in respect to biological transmission is the appreciation that in some instances the infective agent undergoes a cyclic morphologic change in the body of the arthropod, while in other instances, the parasite undergoes simple multiplication; in still others there is both a cyclic change and a multiplication. It is worth-while to examine the different arthropods in respect to these two characteristics. Epidemiologists are greatly concerned with these two factors because they affect so much the behavior and geographical distribution of the disease concerned. The interpretation of the observed epidemiological phenomena and the institution of the indicated control measures are all related to these characteristics.

The most complicated mechanism involved in biological transmission of the infective agent is known as **cyclo-propagative.** In this cycle the parasite undergoes a developmental cycle with morpholgical changes, and at the same time, multiplies in the body of the insect-hosts; this cyclic stage and propagation is entirely apart from any developmental process or multiplication taking place in man. The classical example of this **cyclo-propagative** development transmission is malaria. The sexual cycle with multiplication taken place in the mosquito, the definitive host and in man, the intermediate host, the plasmodium undergoes an asexual cycle. There is thus an extrinsic incubation period while the parasite undergoes change and increase in number in the mosquito, and an intrinsic incubation period during which the asexual cycle takes place in man.

A second and less complete form of biological transmission is the **cyclo-developmental,** in which the microorganisms undergo a cyclic change in the arthropod host but do not multiply there. Here the best example is filariasis, where the worm undergoes morphological changes in the mosquito but does not increase in number. This disease, filariasis, was the first to be definitely proved to be insect-borne, when Partick Manson made this fundamental discovery in 1878.

The third type of biological transmission is termed **propagative,** as the etiological agent undergoes simple multiplication, without any morphological changes. Typical example of this **propagative transmission** is that of the Rickettsiae of typhus fever in lice.

Mechanical Transmission

Where it is not necessary for the infective agent to undergo a period of development or multiplication in the **arthopod** host, biting vectors may transmit the disease mechanically. Usually, the infective agent spread by this means of transmission is a bacteria. Bubonic plague, or the spread of Typhoid by flies, is the best example of mechanical transmission.

It is evident that most of the important diseases of man with which epidemiologists are concerned fall into the group of diseases with biological transmission. Those which undergo cyclo-propagative and propagative transmission concern us most as in these diseases the parasite undergoes multiplication, and because the survival of the parasite in the arthopod host is more certain, and in turn the infection of man is statistically more likely.

(Continued on page 20)

EDITORIAL

(Continued from Page 5)

Senate 897—A Bill to Amend the Act Known as the "Insecticide Act of 1910" (36 Stat. 331), Approved April 26th, 1910.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, that Section 7 of the Insecticide Act of 1910 (36 Stat. 331; 7 U.S.C., 1940 edition, 130) be amended by striking the period at the end of said section, inserting a colon in lieu thereof, and by adding the following: "Provided, however, that any white powder insecticide or fungicide containing arsenic in its elemental form or in any of its combinations, or fluorine in any of its combinations, shall, unless deemed unnecessary by the Secretary of Agriculture for the protection of the public health, be deemed to be adulterated unless it is distinctly colored in accordance with regulations promulgated by the Secretary of Agriculture. The Secretary of Agriculture is hereby authorized to make and promulgate rules and regulations for carrying out the provisions of this proviso and to specify the colors and the compounds or substances to be used to produce such colors."

That there may be "bugs" in the proposed bill now in "Senatorial Committee" which will need ironing out before enactment, or, if passed, subsequently during enforcement, no one will deny. Of these, in general and not with specific reference to this Bill, Dr. Alvin J. Cox, Chief of the Bureau of Chemistry of the State of California, Sacramento, whose knowledge of matters affecting insecticide law enforcement needs no introduction, had this to say in a letter—which, incidentally, antedated introduction of Senator Bailey's bill—to "Soap and Sanitary Chemicals" (January, '43 issue):

"As you know, this problem has interested me for some time, but I have been somewhat reluctant to suggest that California law be amended to require coloration of poisonous materials because there are so many difficulties in phrasing an adequate and satisfactory requirement. There are so many aspects to the problem that we have been uncertain about the advisability of handling this matter by state legislation due to the possibility of conflict and confusion. For example, one state might require both arsenic and fluorine compounds to be colored pink, and another state or municipality might require arsenic compounds to be pink, and fluorine compounds to be blue or green. It is obvious that **conflicting** requirements would present a huge problem to manufacturers. If there could be a basic federal law, it is my opinion that most of them would follow as they have done the Federal Food, Drug and Cosmetic Law.

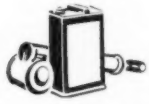
"Other points to consider include the intensity of color. For example, commercial calcium arsenate adequately colored is frequently mixed with equal parts, or more, of a white inert diluent to be sold as a dust. In this manner the color is diluted until it is almost imperceptible. Should the ideal law specify the intensity as well as the tint and other characteristics of a prepared dust?

"In discussing these problems, a federal authority told me that there had been some objection to coloration of poisonous materials inasmuch as the pink, blue, or green powders might be especially attractive to children. Also, certain colors might be unacceptable to the pests to be controlled.

"We agree with your (*Editorial*) stand that some requirement of law is needed, but we all wish to consider every advantage and objection before phrasing a requirement. Your comments on the problem and suggestions towards attaining national uniformity would be greatly appreciated."

Of contiguous interest also is NPCA's Service Letter 289, wherein agreement in principle with the policy of avoiding white fluorides for insecticide purposes is voiced, with further comments in this vein:

Our serious objection has mainly to do with any efforts that will mean a specific color in connection with any mixtures that may contain fluorides. As indicated in previous letters, there has been an over-emphasis in some city ordinances that call for a very specific nile blue. Obviously, it is impossible to expect the specific nile blue coloring when there are mixtures of, let us say, sodium fluoride, pyrethrum, and other inert substances (pyrophyllite, walnut shell flour, clay, talc, celite, etc.). It seems to us that the ends of safety are met when it is indicated that preferable color be of blue shading or any color so long as the mixture is not white.

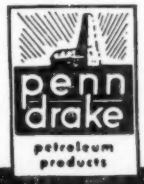


Your fly spray will float longer, penetrate deeper, and maintain maximum toxic effect when used with Penn-Drake INSECTI-SOL, the ideal solvent base.

100% volatile, INSECTI-SOL evaporates entirely upon completion of toxic action. Full-floating, crystal clear and permanently odorless . . . does not soil or stain clothing, drapes, rugs, etc.

WRITE . . . Dept. 108 for valuable information on how Penn-Drake INSECTI-SOL can benefit your business.

MOTHICIDES . . . Write for complete details on Penn-Drake Deodorized Naphtha, the perfect base for mothicide preparations.



PENNSYLVANIA REFINING COMPANY
GENERAL OFFICES: BUTLER, PA.
Refineries at Karns City and Titusville, Pa.
Makers of White Oil, Technical Oil, Petrolatum, Petroleum Sulphonates, Etc.

Definition of the Insecta or Hexapoda

By G. CHAGNON, *Service of Entomology, University of Montreal*

EDITOR'S NOTE: The following paper was read by Professor G. Chagnon and elaborated upon with illustrations at the First Canadian Pest Control Operators' Conference, University of Montreal, Montreal, Canada, March 18, 1943.

THIS PAPER which I have the honour of reading to you is a hasty review of the general external structure of insects. As you all know, insects are among the most highly specialized invertebrate animals and have developed many structures which are peculiarly adapted to the lives they lead. They belong to the great class **Insecta** or **Hexapoda** the members of which have the body divided into head, thorax and abdomen. They carry one pair of **antenna,** the thorax carries three pairs of legs and one or two pairs of wings. The abdomen is devoid of legs and the genital opening is situated near the anal extremity of the body. Some forms however do not possess wings and these belong chiefly to the **Collembola** (springtails) and **Thysanura** among which are found our species of **Lepisma** generally known under the common name of "Silverfish".

There are also among wingless insects the **Mallophaga** and **Anoplura** commonly known as **lice** and the **Syphonaptera** commonly known as fleas.

Number and size of Insects.

Insects comprise about 70 per cent of the known species of all kinds of animals. Over 700,000 species of insects have been described, but entomologists know very well that the number of species yet undescribed is immense. Probably there are four or five times this number of unknown forms distributed over the tropical regions of the earth. The **Coleoptera** or beetles alone number at the present time about 230,000 known species and among them we find the **Rhynchophora** or weevils with much over 30,000 species.

The **Hymenoptera** (Ichneumons, wasps, bees, etc.) and the Diptera (two-winged flies) comprise also a vast number of known species which undoubtedly will be increased by hundreds of thousands when the more minute forms are known. W. H. Ashmead, a well known hymenopterist, believed that nearly one million unknown species of parasitic **Hymenoptera** alone existed.

Insects vary greatly in size. Some are very small, measuring a little more than a 1/4 of a millimeter, while others attain a length of nearly 250 millimeters or over 10 inches. These giants are seen among the **Orthoptera** of the family **Phasmidae** (walking sticks, etc.) and are restricted to the tropical and subtropical regions. Among the **Lepidoptera** are giants too, **Erebus agrippina** a brazilian noctuid moth is said to have a wing expanse of 280 millimeters or about 12 inches. Some beetles are very large, I may mention among them the African species of **Goliathus** and some South American Cerambycid species which measure from 5 to 7 inches in length.

The External Anatomy of Insects

I. **The structure of the body-wall.** Three more or less distinct layers can be recognized in the body-wall of an insect: the outer protecting layer, termed the **cuticula;** an intermediate cellular layer, termed the **hypodermis;** and an inner delicate membranous layer, termed the **basement membrane.** These layers are seen only by a study of carefully prepared microscopic sections of the body-wall.

The **Cuticula** is the outermost layer of the body and appendages and is largely composed of the substance known as **chitin.** When freshly formed it is flexible and elastic and it remains in this condition in the intersegmental membranes and the articular membranes of the appendages. For the most part however, and especially in adult insects, the **cuticula** usually becomes hard and inelastic. The nature of the change from flexible to hard **cuticla** is not known, and among many insect **larvae** the **cuticula** remains membranous. The change is usually spoken of as chitinization. The elasticity of the soft **cuticula** is well shown by the stretching of the body-wall after a molt. It is also shown by the expansion of the intersegmental **cuticula** to accommodate the growing eggs of the female as in the queens of Termites and other insects.

Cuticular processes are seen on nearly all insects. The surface of the cuticula is often sculptured in various ways and bears a great variety of outgrowths which are integral parts of its substance.

There are hairs, spines and tubercles of different shapes or projections as seen in many **coleoptera,** the males of certain Scarabeid species for example which exhibit long thoracic and cephalic horns.

II. **The regions of the body.** The body of an insect is composed of three usually well defined regions: The **head,** the **thorax** and the **abdomen.** The head carries the **antennae,** the eyes and the mouth parts. The thorax bears the locomotory organs: the legs and wings. The abdomen is concerned with reproduction and may carry appendages associated with the latter function.

The Head

The principal regions of the head of an insect, a locust for example, may be identified as follows:

The **vertex** is the upper part of the head and generally lies between the compound eyes. It usually carries the paired ocelli and antennae. The **occiput** is the hinder part lying between the vertex and the neck. The **frons** or front follows the vertex and generally bears the median ocellus. The **clypeus** lies immediately anterior to the frons. The **labrum** is an unpaired sclerite usually movably articulated with the **clypeus** by means of a suture. The labrum is also termed the upper lip of the mouth parts.

The **antennae** are a pair of very mobile jointed appendages which are articulated with the head in front or between the eyes. They are often filiform and many-jointed. They vary, however, very greatly in form. They are very short and hidden in a cavity near the eyes in the aquatic **Hemiptera;** they may be filiform or thread-like, pectinate, lamellate, clavate, plumose, etc. In some cases as in many Orthoptera, (cockroaches, Katydids) they measure two or three times the length of the body. They are very short in a great many Diptera, composed of only three free segments, the third bearing a distinctly annulated appendage known as a **style** or a bristle-like appendage termed **arista.**

The Mouth Parts

The chewing type of mouth parts consists typically of an upper lip or **labrum** and of an under lip or **labium.** The upper jaws are termed **mandibles,**

the lower jaws are termed **maxillae.** These movable organs are each furnished with a pair of articulated appendages termed respectively **maxillary palpi** and **labial palpi.** There is also the **hypopharynx** which is a tongue-like prolongation of the floor of the mouth usually attached to the inside wall of the labium. This organ may also be differentiated in other types of mouth parts.

The **mandibles** or first pair of jaws are the most important parts of the mouth structures in chewing insects. They are generally provided with small teeth or projections on the inner side which work against those of the opposite side and so make very efficient grinders. The mandibles in certain beetles often attain a very large size (stag beetles and certain cerambycids).

The **maxillae** or second pair of jaws are much more complicated in structure, each maxilla consisting principally of the **lacinia** or blade, the appendages of which are the **maxillary palpi** or feelers and the **galea** situated between the palpus and lacinia.

The **labium** or under lip is the most ventral of the mouth parts. It appears to be a single organ, although sometimes cleft or divided at its distal extremity.

The Piercing-Sucking Type of Mouth Parts

The **Hemiptera** (bed-bugs, assassin bugs, etc.) and the **Homoptera** (Cicadas, aphids, etc.) have a very different type of mouth parts. They are here exclusively adapted for piercing and sucking, the mandibles and **maxillae** being modified to form slender bristle-like stylets which rest in the grooved labium or sheath. Both pairs of stylets are hollow seta-like structures, capable of limited protrusion and retraction. They do the work of piercing the plant or the animal and drawing out the sap or blood. The **labrum** in this type is a short flap covering the groove in the labium toward the base of the latter. The mandibles are generally provided with sharp barbs near the apex. As the stylets are alternately thrust out from the head and pulled back, the barbs catch in the leaf tissue or flesh and help to sink the stylets deeper, until the sap or blood is reached. Each maxilla is doubly grooved along its inner face, and fit tightly together to form two closed tubes known as the food channel, and the salivery duct. The **labium** shortens up or bends back and never enters the plant tissues or flesh. While at rest the **rostrum** or beak is concealed by being flexed beneath the body.

The bedbug, **Cimex lectularius** is of great annoyance to man as we all know. Of all the **Hemiptera** it is the most important in this respect. It is also the most cosmopolitan of human parasites and may be concerned with the transmission of various diseases. The peculiar disagreeable odor of the bedbug and other Hemiptera is due to the secretion of the stink glands which lie on the inner surface of the mesosternum and open by a pair of orifices situated near the hind coxae. Bedbugs were formerly made use of in medicine, and are, even today, considered a remedy for malaria, and this idea persists in some sections of America and Europe. The more disgusting a remedy, the more efficient it is considered by many.

The Mouth parts of Diptera which are also of the piercing or sucking type, exhibit a wide range of structure, and there are many differences of opinion in interpreting the morphology of certain of the component parts.

The mouth parts of Diptera attain their fullest development in those **Nematocera** and **Brachycera** with blood-sucking habits, the **Culicidae** or mosquitos, and the **Tabanidae** or horse-flies for example. In these forms, the mouth parts, with the

HENRY SUNDHEIMER
INCORPORATED
103 PARK AVE. NEW YORK
MURRAY HILL 5-4214-5

FLOURINE SPECIALISTS FOR 35 YEARS

Announces

NEW

FLUFFY - 95% THROUGH 325 MESH

SODIUM FLUOSILICATE

Tinted and White

• Considered by PCOs and entomologists not only more toxic and equal to, if not more effective, than Sodium Fluoride for Roach Control. Superior to Sodium Fluoride for Chicken Lice. Available at lower cost. Production not allocated or on critical list.

Contact Your Local Jobber or Write Us Direct for Samples and Prices.

NATIONAL PEST CONTROL ASSOCIATION

exception of the **palpi** and **labium**, are either stylet-like or blade-like, and adapted for piercing. The females are unique among **Diptera** in possessing mandibles. The latter organs are generally absent in the males. The latter, therefore, cannot pierce and are inoffensive.

In other flies, the housefly for instance, all the mouth organs contribute to the formation of a sort of proboscis. Its morphology is difficult to understand owing to the modification and reduction of the **maxillae**, and the increased development of membranous areas in order to give to the whole organ its flexibility. At the tip of the **labium** there is on each side a lobe-like appendage termed **labella**. The **labella** of certain flies are quite large. In the housefly for example, they are expanded into broad plates which are fitted for rasping. In **the mouth parts of Lepidoptera**, (butterflies and moths) the mandibles are totally wanting and the **maxillae** are modified to form a suctorial **proboscis**. This tube is not capable of piercing tissues. When not in use, it is kept coiled up under the head like a watch spring. The labial **palpi** are well developed, very hairy, and are generally upturned towards the face.

Among the **piercing-sucking type of mouth parts** we also find the **Anoplura** or sucking lice and the **Siphonaptera** or fleas.

The **Anoplura** are ectoparasites of mammals. The mouth parts are modified for piercing and sucking and are retracted within the head when not in use. Their legs are provided with strong claws fitted for clinging to hair; they are wingless and the spiracles are dorsal.

The **Siphonaptera** or fleas are well known to all. They are blood-sucking ectoparasites of warm-blooded animals. Many fleas are conspicuous by the presence of short, stout spines on the body. The presence or absence of these and their location are important distinctive characters.

The **Hymenoptera** exhibit a type of mouth parts which may be termed the **Chewing-lapping type.** This type which is so well illustrated by the honey bee, is a kind of combination type in which the labrum and mandibles are of the same structure as in the chewing type, but the maxillae and the **labium** are elongated, forming a sort of suctorial apparatus. On the whole, the mouth parts of the **Hymenoptera** exhibit a wide range of differentiation and it is hardly possible to give here a more detailed account of the different forms. I might say the same thing of the mouth parts of Diptera.

THE THORAX

The thorax is divided into three distinct regions: the **prothorax**, the **mesothorax** and the **metathorax.** The first of these regions bears the first pair of legs, the second region or mesothorax bears the second pair of legs and the first pair of wings, the third region, the metathorax bears the third pair of legs and the second pair of wings **when these are present.** In the **Diptera**, as you know, only two wings are present and are borne by the mesothorax. The hind wings are replaced on the metathorax by a pair of slender processes termed **halteres.** Should one of these processes be cut off, the insect will be seen flying in circles without definite direction.

The dorsal part of the thorax is generally termed **notum** and the ventral part is termed **sternum.** These parts are therefore designated as the pronotum, the **mesonotum** and the **metanotum** respectively. The same may be said of the sternum (prosternum, mesosternum and metasternum).

The legs. The legs of insects consist of the following parts: the **coxa**, (the nearest part to the body) the **trochanter** the **femur**, the **tibia** and the **tarsus**, the latter being generally formed of five segments.

The legs of insects are fitted for running, walking, jumping or swimming. They are well represented in their normal condition in cockroaches and tiger beetles. In scarabeid beetles the fore-legs are modified for burrowing and in Mantids for seizing and holding the prey. The fore-legs in a great many butterflies are so much reduced that they are unfit for walking. The hind legs are greatly developed in most **Orthoptera** (locusts, crickets) and permit jumping. In the Dytiscid beetles and aqatic **Hemiptera**, they are fitted for swimming being greatly flattened for that purpose.

The **tarsus** is generally provided, at its terminal segments, with a pair of claws and between these, on the ventral side, are often seen two lobes or pads termed **pulvilli**, and sometimes a third one is seen between the **pulvilli** and is termed **empodium.** These organs are generally present in the **Diptera**, enabling their possessors to climb smooth or steep surfaces. In these insects, there are very small hollow hairs on these pads through each of which a sticky substance exudes permitting a fly to walk upside down and up very smooth surfaces.

The Wings. Owing to their wide range of differentiation, wings provide one of the most useful characters for purposes of classification. Wings are thin plate-like expansions which are strengthened by a frame-

THE TOX-EOL SYSTEM

Pioneered the Use of

CHLORINATED PHENOLS FOR TERMITE CONTROL
WHICH ARE NOW UNIVERSALLY ADMITTED TO BE HIGHLY
EFFECTIVE FOR BOTH SOIL POISONING AND WOOD PRESERVATION

CHEMICALS AVAILABLE FOR PROMPT SHIPMENT

"TOX-EOL"—6 Liquid Concentrate

To be diluted with 6 parts cheap petroleum distillate or even crankcase drainings. Almost stainless and leaves no persistent odor. Used for both ground and wood treatment in the "TOX-EOL SYSTEM" of TERMITE CONTROL.

CRE-O-TOX "S" 9 Liquid Concentrate

To be diluted with 9 parts WATER. For soil poisoning only. Contains not only one but 3 recognized effective soil poisoning chemicals. May be used in conjunction with "TOX-EOL"—6 in the "TOX-EOL SYSTEM."

WRITE TODAY FOR DETAILS of 5-year Warranty and Dealer Co-Operation Plan.

"PHOSPHOR-KILL" Zinc Phosphide Paste for RATS, MICE, etc.

Contains 7% to 8% zinc phosphide. Readily diluted to mix with bait. Sample 1-lb. can, 50c postpaid. 5 lbs. $2.00—10 lbs. $3.75, f.o.b. Memphis.

CRE-O-TOX CHEMICAL PRODUCTS COMPANY

Insecticides & Fungicides

MADISON AT WILLETT **MEMPHIS, TENNESSEE**

work of hollow chitinous tubes known as veins. A wing is composed of upper and lower layers which may readily be separated in an insect newly emerged.

The complete system of veins of a wing is termed its **venation.** The venation presents characters of great systematic importance, but unfortunately the various systems of nomenclature in use are more or less confusing.

The first pair of wings in the **coleoptera** or beetles are strongly chitinized and thickened, forming a pair of "wing-covers" or **elytra** and are veinless; they meet in a straight line along the middle of the back.

In certain other insects as in the **Hemiptera,** they are only partly thickened. In nearly all the other insects, the front and hind wings are thin and membranous. They may be hairy in caddis flies or scaly in butterflies and moths. Prothoracic wings are unknown in living insects but they existed in certain fossil forms.

Many adult insects do not possess wings. **Thysanura** (silver-fish) and **Collembola** (springtails) represent wingless insect groups, whose ancestors apparently never had wings. Others, such as fleas, lice and certain ants have lost their wings owing to an adaptation to a more quiescent mode of life as parasites on the bodies of animals or in the ground.

The Abdomen

The terminal region of the body, the abdomen, consists of a series of similar segments, which are without appendages excepting certain segments near the end of the body.

The body-wall of an abdominal segment is comparatively simple consisting in adults of a **tergum** or dorsal part and **sternum** or ventral part. The number of segments of which the abdomen of adult insects appears to be composed varies greatly. Sometimes, there are only three or four visible, while in many insects ten or eleven segments can be distinguished. All inter-grades between these occur.

Most insects have more or less prominent appendages connected with the reproductive organs. In the males these appendages constitute the genital **claspers** and in females, the **ovipositor.** The latter is very apparent in many Orthoptera; it is often very attenuated and thread-like in many parisitic Hymenoptera, and constitutes a stinging organ in wasps and bees.

In some insects, as in most Thysanura (or silverfish) Plecoptera and Ephemerida, (or mayflies) there are long and many jointed appendages, the **cerci.**

The first abdominal segment in the **Hymenoptera** (ants, etc.) is generally fused with the metathorax and is known as the **propodeum** or **median segment.**

As we all know, the vast majority of insects breathe by means of internal air-tubes known as **tracheae.** The air enters the tracheae through paired and usually lateral openings termed **spiracles** or **stigmata,** which are segmentally arranged along the thorax and abdomen. In some insects, however, the spiracles are closed or wanting, in such cases respiration is cutaneous as in the larvae of certain parasitic insects.

Insect Control

While the lessening of insect damage or the control of insect outbreak is not the aim of all insect study, it is, nevertheless the most important. It is necessary to possess a perfect knowledge of the different types of insect structure in order to know what kind of poison to apply. For instance, while the insects with piercing and sucking mouth parts will be controlled in most cases by contact poisons, those with chewing mouth parts will be controlled by means of both contact and stomach poisons.

Legislation Relating to Rodents

(Continued from page 7)

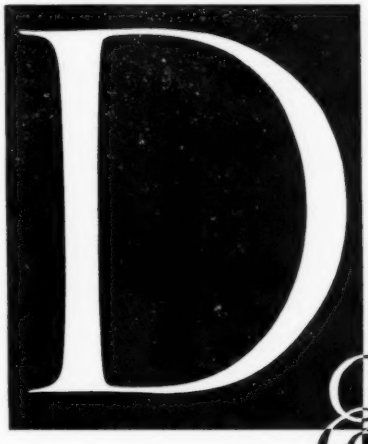
"Any person, firm or corporation engaged in the business of pest control, and registered with the Westchester County Department of Health, White Plains, N. Y., will be considered as complying with the provisions of this section relating to the posting of signs where poisonous substances are used as exterminators or insecticides, provided a sign is posted conspicuously, stating the name and address and telephone number of the person, firm, or corporation undertaking such work. By 'conspicuous' is meant that it will be in such a location that it can be readily seen by the inspector, doctor or police officer upon entering the kitchen or other place where food is being prepared. In small lunch wagons and stores such a sign can be placed below the top of and at the rear side of the food counter. The success or failure of the enforcement of the regulation depends on the cooperation of all persons engaged in the use of such materials."

3. Some states and cities prohibit the sale or distribution of virus to control rats and mice. The California State Board of Health on May 1, 1926 adopted the following resolution:

"WHEREAS, several alleged rat exterminators, the efficiency of which depends upon the use of cultures of bacteria which may contaminate human food supplies, have been placed upon the market and advertised for sale in California, and WHEREAS, experiments conducted by the consulting bacteriologist of the California State Board of Health have failed to demonstrate any great exterminating efficiency in these products, have determined that their use may lead to the production of a chronic carrier state in rodents with bacteria which are known to cause human food poisoning, therefore, be it RESOLVED, that the California State Board of Health forbids the sale or exposure for sale of this type of alleged rat exterminator within the State of California.—."

The Sanitary Code of Connecticut, Revision 1930, Chapter 1, Reg. 47 reads: "Pathogenic bacteria designed to produce disease in rodents shall not be sold or distributed for that purpose without permission from the state department of health."

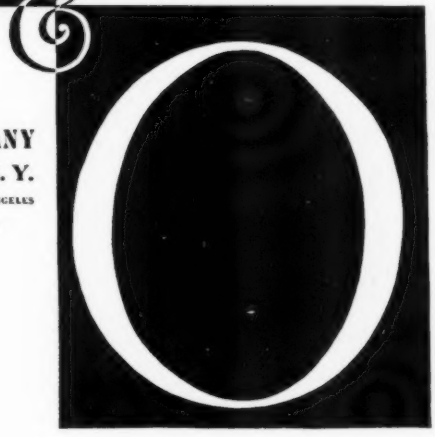
The cities of Cleveland, Ohio, Newark, N. J. and New York, N. Y. have adopted regulations concerning the sale of virus, all of which read about as follows: "No person shall prepare or manufacture, sell, offer for sale, give away, deal in, supply, or use, or have in his or her possession with intent to sell, offer for sale, give away, deal in, sup-



D & O PURIFIED PYRETHRUM EXTRACTS

The development by Dodge & Olcott Company of a series of Pyrethrum Extracts of high concentration — and a remarkable degree of purity, has substantially revolutionized, not only the manufacture, but also the use of Pyrethrum products.

For the first time, Pyrethrum materials, free from irritating and allergy-producing substances and practically free from other material impurities, are available, at reasonable costs. The resultant expansion in potential use and methods of use is already great, and further developments are continuing the extent and direction of which are hardly predictable.



DODGE & OLCOTT COMPANY
180 Varick St., New York, N. Y.
BOSTON • CHICAGO • PHILADELPHIA • ST. LOUIS • LOS ANGELES
Plant and Laboratories, Bayonne, N. J.

D&O
ESTABLISHED 1798

ply, or use an exterminator or insecticide which contains living bacterial organisms or any culture or preparation thereof."

4. The sale of thallium salts is prohibited in California as stated in their Agricultural Code, Division 5, Chapter 7, Article 3, Sec. 1066 which reads:

"It shall be unlawful for any person to sell or to possess within this State any thallium salts or preparation thereof, unless the same is for sale to and for official use for pest control purposes by Federal, State, or county officers or employees or under their immediate supervision, or for sale to and for use by licensed physicians, surgeons, pharmacists, or veterinarians in connection with their respective professions, or for sale —."

5. An interesting text of legislation relating to the sale and use of rodenticides is quoted from the regulations of the Plainfield, N. J. Health Department:

Article 11, Nuisances, Section 1, (n) under Vermin and Insect Exterminators. "The sale of any poisonous substance, either gaseous, liquid, solid or semi-solid, for the extermination of vermin or insects unless such substance is clearly and legibly labeled and so sealed as to make the accidental use of such substances improbable."

Mailing and Shipping

There are certain laws and regulations covering the mailing and shipping of rodent control products. As most products are of a poisonous nature, such rodent poisons can not be shipped or sent by mail. The Postal Laws and Regulations of 1940, Section 588 reads as follows:

"All kinds of poison, and all articles and compositions, and all poisonous animals, insects, and reptiles, and explosives of all kinds, —, and all disease germs and scabs, and all other natural or artificial articles, compositions, or material, of whatever kind, which may kill or in any wise hurt, harm, or injure another, or damage, deface, or otherwise injure the mails or other property, whether sealed as first-class matter or not, are hereby declared to be nonmailable matter and shall not be conveyed in the mails or delivered from any postoffice or station thereof, not by any letter carrier; but the Postmaster General may permit the transmission in the mails, under such rules and regulations as he shall prescribe as to preparation and packing, of any articles hereinbefore described which are not outwardly or of their own force dangerous or injurious to life, health, or property: Provided, That the transmission in the mails of poisonous drugs and medicines may be limited by the Postmaster to shipments of such articles from the manufacturer thereof or dealer therein to licensed physicians, surgeons, dentists, pharmacists, druggists, cosmetologists, barbers, and veterinarians, under such rules and regulations as he shall prescribe. —."

The question might be raised as to the mailability of red squill. As red squill is not considered to be a poison, no regulations will be found under the above Section 588. A letter from the Post Office Department to the U. S. Department of Agriculture gives the following statement: "The Postmaster General, under date of May 14, 1930, authorized the acceptance in the mails of Red Squill and preparations containing Red Squill, when put in tightly closed metal containers and then packed in suitable boxes made of strong double faced corrugated fiberboard or material of equal strength."

All poisonous gases, liquids, and solids may be shipped by the Railway Express Agency, Inc. if such shipments conform to the regulations of the Interstate Commerce Commission. Certain of these gases, liquids, and solids can only be shipped in containers made according to definite specifications so that these regulations will be omitted. However, it may be of interest to know the regulations for the shipment of small packages of poisonous solids so that abstracts of these regulations will be given. The following sections of I. C. C. Regulations No. 4040, issued Feb. 27, 1941 "Rules for the Transportation of Explosives and Dangerous Articles by Express" follow:

Sec. 325 (a) "Poisonous articles for the purpose of these regulations are divided into three classes according to the degree of hazard in transportation.

b) Extremely Dangerous Poison — Class A.

c) Less Dangerous Poison—Class B.

d) Tear Gases or Irritating Substances—Class C.

Sec. 350. Less Dangerous Poisons—Class B—Solids—Poison Label. "Poisonous solids (including pastes and semi-solids) are substances of such nature that they are chiefly dangerous by external contact with the body or by their being taken internally as in contaminated food or feeds.

Sec. 351. Packing. (a) "Closing and cushioning.—All containers must be tightly closed. Inside containers must be cushioned as prescribed, or in any case when necessary to prevent breakage or leakage.

b) "Testing inside containers.—All inside containers, except those made of glass, must be able to pass a test by dropping, after filling, from a height of 4 feet to solid concrete without rupture or sifting of contents, except that for bags with contents weighing 25 pounds, a drop of 2 feet is required.

Sec. 352. (a) "Poisonous solids, Class B, except cyanides, in tightly closed containers, securely cushioned when necessary to prevent breakage and packed as follows are exempt from specifications packaging and labeling requirements.

b) In inside glass, earthenware, or metal containers, or lock-corner sliding-lid wooden boxes, of not over 5 lbs. capacity each, or chipboard, pasteboard, or fiber cartons, cans, or boxes, or not over 1 pound capacity each, packed in outside wooden or fiber board boxes, or wooden barrels or kegs. Net weight of contents of outside container, not over 100 pounds.

Sec. 404. Labels. (a) "Shippers must furnish and attach the labels prescribed for their packages. Labels should be applied to that part of the package bearing consignee's name and address.

d) (1) Labels must conform to standards as to size, shape, and color, and samples will be furnished, on request, by the Bureau of Explosives.

j) Labels for poisonous articles and tear gases must be of diamond shape, white in color, and with each side 4 inches long. Printing must be in red letters inside a red-line border measuring 3½ inches on each side and shown below.

k) Poison label—illustrated."

As few shipments are made by individual firms by freight, these regulations will not be given. One should consult their local freight agent for this information.

Regulation of Pest Control Operators With Relation to Rodent Control

This section will quote legislation and other regulations relating to the registration, licensing and regulation of pest control operators for extermination procedures rather than fumigation operations in relation to rodent control. "Extermination" might be defined as the use of powder and liquid insecticides and rodenticides in contrast with "fumigation" which is concerned with the use of gases or fumigants. All references to "extermination" herein will refer to rodenticides other than fumigants, their application and other procedures. Fumigants and fumigating will not be considered even though in part rodent control automatically comes within the scope of many state and local fumigating laws, ordinances, and regulations when such operations involve "space" fumigations. Generally speaking, the use of fumigants in burrows and confined runways are not viewed as fumigations.

There are no Federal laws requiring the licensing of pest control operators.

Some few states have adopted legislation relating to the regulation of pest control operators which obviously includes rodent control. Among such states are Alabama, Arkansas, California, Louisiana, and Mississippi. The State of California adopted the Statutes of 1935 with amendments or changes from time to time. The Act is known as the "Structural Pest Control Act of California." This Act is carried out by the Department of Professional and Vocational Standards of which this subdivision is called the "Structural Pest Control Board" that has supervision over the promulgations of the Act. This Board consists of five members appointed by the Governor, three of whom shall be operators engaged in the business of pest control. The principal requirement of this Act is that operators must be licensed after meeting certain qualifications and passing an examination. A few of the more pertinent sections will be quoted from the most

recently adopted Structural Pest Control Act, Section 1, Chapter 14. (Effective Sept. 13, 1941.)

Article 3. Application of the Chapter

8550. "It is unlawful for any person to engage in the business of, act in the capacity of, or advertise himself as, or assume to act as, an operator or a field representative unless he is licensed as such under this chapter."

8552. "It is unlawful for any person to advertise or represent in any manner that any pest control work, in whole or in part, has been done upon any structure, unless the work has been performed by a person licensed under this chapter."

Article 4. Issuance of Licenses

8565. "The board shall ascertain by written examination that an applicant for a license as operator is qualified in the use and understanding of all of the following:

(a) The English language, including reading, writing, and spelling.

(b) The building and safety laws of the State and —.

(c) The labor laws of the State.

(e) Poisons and other dangerous chemicals used in pest control, —."

Article 8. Revenue

8674. "The amount of fees prescribed by this chapter is that fixed by the following schedules:

Operator's examination	$10.00
Original operator's license	5.00
Renewal operator's license	15.00"

The State Department of Agriculture in California takes definite control, in addition to their licenses from the Structural Pest Control Board, when pest control operators enter the field of agriculture, such as warehouses where commodities such as wheat, barley, rice, and beans are stored. Section 150 of the Agricultural Code states as follows:

"The commissioner shall prescribe and enforce rules for the qualification of any person who engages for hire in business of eradicating or controlling pests within the county, and issue certificates to all persons whom he shall find by examination or otherwise to be qualified for such work. —."

The four southern states will be considered in a group as such legislation is administered primarily by State Plant Boards and much of the legislation contains similar phraseology although there is a wide divergence in some of the sections. The Louisiana State Act 69 was adopted in 1930 but revised in 1942, now known as Act 124. The Mississippi State Law as House Bill No. 112 was passed in 1938. The Alabama State Act 548 was adopted in 1939 while the Arkansas State Act 394 was passed the same year. Hereafter, only the state will be mentioned in referring to their official Act. Instead of listing the legislation of each state as a whole the more pertinent sections will be quoted under separate headings in order to segregate subject matter in topic form.

In studying this legislation, it will be noted that pest control operators are given the status of being engaged in professional services or work. Alabama and Mississippi apparently patterned their classification of pest control operators under the cognomen of "Entomological Work" as originally referred to in the Louisiana Act of 1930. Section 1 (d) of the present Alabama Act reads as follows:

"Entomological Work" shall mean a person receiving fees for advice or prescriptions for the control or eradication of any insect pest or rodent; receiving fees for actual spraying, dusting, fumigating, or any other methods used for the control and eradication of any insect pest or rodent."

All four states require that pest control operators obtain a permit or license to operate. Section 5 of the Alabama Act reads:

"That any persons desiring to engage in professional services or work as herein defined shall obtain from the Commissioner of Agriculture and Industries a permit or license to engage in such professional services or work and the application for such permit or license shall be made in writing and on such blank forms as may be required. The fee for the permit or license shall be $10.00, payable to the Commissioner of Agriculture and Industries, which shall accompany the application for permit or license; provided, however, that the nurseryman — shall not be required to pay the fee —. The State Board of Agriculture and Industries shall require applicants to submit statements as to training and experience in professional practice and may further require applicants to pass such tests or examinations as the Examining Board may prescribe. If applicant fails to pass the examination, the fee shall be returned to him. This permit or license expires on September 30, the end of the fiscal year for which it is issued."

The Arkansas Act reads:

Sec. 1 "License Required: Penalty. Any person, firm, or corporation who shall, for compensation, give advice, or engage in work, for the control of insect pests, plant diseases, and/or rodents, or who shall solicit such work in any manner, shall be deemed guilty or a misdemeanor unless said person,

There is no better way to tell our story than by

MOVIE

Part Showing Record

Fox Wisc. Amusement Corp.
Cudahy High School
Bay View High School
Longfellow Junior High
Waukesha Health Dept.
Parklawn Housing Administration
Rooming House Association
Emanual Reform Church
Shorewood Cooperative Club
Milwaukee Apt. Owners & Managers Ass'n.
Urban League—National Negro Health Week

You Can Do the Same in Your Town

Price, $110.00
Send for Pamphlet

HENRY TURRIE
522 W. North Ave., Milwaukee, Wisc.

firm, or corporation is in possession of a valid license issued for that purpose by the State Plant Board and on conviction thereof shall be punished by a fine of not to exceed $300.00."

Sec. 3 "Invalidation of License. Any license may be declared invalid by the State Plant Board or by its authorized representative, after a hearing, for any of the following causes: (1) If the license-holder shall receive compensation for advice or for work other than that covered by the license, (2) If the license-holder or any employee, solicitor, agent, or representative shall make misrepresentations for the purpose of defrauding, or shall make promises which are not carried out, or shall use methods or materials which are not suitable for the purpose for which they are employed, (3) If the license holder shall fail to give to the State Plant Board or its duly authorized representative, upon request, true information regarding methods and materials used, work performed, or other information essential to the administration of this act; (4) If the license-holder shall fail to make the registrations required in Section 5, or shall fail to pay the registration fee. —."

From the foregoing, it will be noted that an examination is a prerequisite for a license. The exact text regarding an examination is given under the Alabama Act, Section 5:

(a) "Application for examination shall be submitted on a regular form furnished by the Commissioner. The applicant shall take an examination, which may be oral, written, or both, as may be determined by the Examining Board and, in general, cover the subject of the professional services designated in the application. Examinations will be held on the 4th Tuesday of January, and on the 3rd Tuesday in September in 1940. Thereafter, semi-annual examinations will be held on the 3rd Tuesday in March and September. Special examinations will be given when deemed advisable by the Commissioner."

(c) "If the applicant fails an examination he will not be permitted to take a re-examination for six months, or until the next regular examination date."

Among provisions of two of the State Laws are bonding stipulations reading as follows: (a) Regulation No. 33 effective January 10, 1940 and made part of the Alabama Act of 1939, Section 7:

(a) "The bond furnished the Board by any permittee as provided in Section 6 of the Act, shall be conditioned so as to insure to the purchaser of services from said permittee the fulfillment of any contract or guarantee made by the permittee. No bond shall be accepted except from surety companies approved by the Insurance Department of Alabama."

(b) "At the discretion of the Board, no bond may be required of a person who does not issue guarantees or contracts to render future services and who does not use secret or unknown formulas. Any person engaged in termite work, and other services as may be specified by the Examining Board, shall be required to give guarantees for his services."

(c) "An annual bond of $1,000.00 shall be required of any person (1) who guarantees his work for a period of one year or contracts to render services for one year, or (2) who uses a secret formula or material of unknown composition."

(d) "An annual bond of $2,500.00 shall be required of any person who shall guarantee his work for more than one year or contract to render service for more than one year, and said bond shall be so conditioned as to be valid and effective for the maximum time for which the permittee shall issue guarantees or contract to render future services."

(b) Mississippi House Bill, Section 8:

(b) Mississippi House Bill, Section 8:

(A) "The bond furnished the Board by a licensee as provided in Section 3 of the Act shall be conditioned so as to insure to the purchaser of services from said licensee the fulfillment of any contract or guarantee made by the licensee. No bond shall be accepted except from surety companies approved by the Insurance Department of Mississippi."

(B) "At the discretion of the Board, no bond may be required of a person doing a gross business of less than $1000.00 who does not issue guarantees or contract to render future services and who does not use secret or unknown formulas."

(C) "An annual bond of $1000.00 shall be required of any person (1) whose gross annual business shall be $1000 and less than $5000 or (2) who guarantees his work for a period of one year or contracts to render service for one year, or (3) who uses a secret formula or material of unknown composition."

(D) "An annual bond of $2500 shall be required of any person (1) whose gross annual business shall be $5000 or more, or (2) who shall guarantee his work for more than one year or contract to render service for more than one year, and said bond shall be so conditioned as to be valid and effective for the maximum time for which the licensee shall issue guarantees or contract to render future service."

There are provisions that applicants or licensees furnish a statement as to methods to be employed in rodent control work and also to furnish sample contract forms that will be used. The Alabama Act reads:

Sec. 5 (b) "If the applicant passes the examination, the Board shall then require that the applicant submit a detailed statement of the methods he will employ and such typed or printed forms of contracts which will be used in the conduct of the professional service for which the application for permit is made. If these are approved, the applicant shall then furnish bond in the proper amount as set forth in Section 7 of the regulations in conformity to Section 6 of the Act. After all requirements have been met by the applicant, the Commissioner shall then issue a permit."

The Mississippi Law reads:

Sec. 6 (a) "If the qualifications and other requirements of the applicant are satisfactory, the Board shall then require that the applicant submit a detailed statement of the methods he will employ and such typed or printed forms of contracts which will be used in the conduct of the professional services for which the application for license is made. If these are approved, the applicant shall then furnish bond in the proper amount as set forth in Section 8 of those regulations in conformity to Section 3 of the Act."

Certain of the state Acts require that all contracts be reported monthly and provides penalties if the contracts are not satisfactorily completed in the judgment of the Board. The text of the Mississippi Law follows:

Sec. 10 "Persons operating under licenses shall furnish the Board on the first of each month a report of all jobs contracted for and completed the previous month on forms provided by the Board. Failure or refusal to make such reports shall cause the license to be revoked. If, on inspection by the Board, it is found that a contract has not been fulfilled, the licensee shall be notified by the Entomologist and shall be allowed thirty days in which to apply such remedial measures as are necessary to fulfill the contract, or such additional time as may seem necessary in the judgment of the Board. If the licensee shall fail to apply the remedial measures within the specified time, or if the treatment shall not be satisfactory to the Board, his license shall be revoked."

A few cities require the licensing of pest control operators, an example of this type of legislation being New York City regulations. A few excerpts from this legislation follows:

Dept. of Health, City of New York. Sanitary Code. Amendment No. 400—1942. Section 104. "Fumigants, exterminators and insecticides; permits, use, sale and distribution regulated. 1. No person shall use in any building, vessel or other place in the City of New York, a fumigant, exterminator or insecticide for the destruction or control of insects, vermin, rodents or other pests, or engage in the business of such fumigation or extermination, without a permit issued therefor by the Board of Health or otherwise than in accordance with the terms of said permit and the regulation of said Board. —."

In concluding this compilation of legislation relating to rodents, it might be well to refer the reader again to the foreword of part I. It is hoped that the citation of these law excerpts may form the basis for further study culminating in uniform, practicable and publicly supported laws.

Acknowledgment is made to Mr. William O. Buettner of the National Pest Control Association for supplying some of the texts of legislation used in this part II.

Note of Caution

From now on no one is authorized to accept new OR renewal subscriptions to "Pests." Play safe; send all subscriptions, new OR renewal, direct to Pests, 512 East 14th Street, Kansas City, Mo. Your cooperation will be appreciated—it will also save misunderstanding all around.

U. S. Insecticide Color Law Needed, Says Cox

Reprinted from Soap & Sanitary Chemicals

A BASIC federal law governing the coloration of insecticidal poisons, if one existed, would be followed by most states just as they have in the case of state food, drug and cosmetic acts, according to Dr. Alvin J. Cox, Chief of the Bureau of Chemistry of the State of California, Sacramento, in a communication to **Soap & Sanitary Chemicals.** Commenting on insecticide coloration as a safety measure and the numerous problems involved, Dr. Cox stated in part:

"I have just read the editorial on page 100 of the December issue of 'Soap and Sanitary Chemicals' with regard to the recent sodium fluoride case in Oregon, for which you are to be congratulated. This editorial states:

"The basic cause of this tragedy lies in the fact that a supply of white sodium fluoride could ever have made its way into an institution of any kind, and particularly into a state hospital for the insane. The absence of a strictly enforced law requiring tinted fluoride permitted these deaths to occur, and Oregon officials have nobody to blame but themselves. Human carelessness may have been a factor, but basically the law was at fault. And the sad part of such tragedies is that we know they will happen again and again, that they will continue to happen until white fluoride is banded for insecticidal use in every state in the country.

"As you know, this problem has interested me for some time, but I have been somewhat reluctant to suggest that California law be amended to require coloration of poisonous materials because there are so many difficulties in phrasing an adequate and satisfactory requirement. There are so many aspects to the problem that we have been uncertain about the advisability of handling this matter by state legislation due to the possibility of conflict and confusion. For example, one state might require both arsenic and fluorine compounds to be colored pink, and another state or municipality might require arsenic compounds to be pink, and fluorine compounds to be blue or green. It is obvious that **conflicting** requirements would present a huge problem to manufacturers. If there could be a basic federal law, it is my opinion that most of them would follow as they have done the Federal Food, Drug and Cosmetic Law.

"Other points to consider include the intensity of color. For example, commercial calcium arsenate adequately colored is frequently mixed with equal parts, or more, of a white inert diluent to be sold as a dust. In this manner the color is diluted until it is almost imperceptible. Should the ideal law specify the intensity as well as the tint and other characteristics of a prepared dust?

"In discussing these problems, a federal authority told me that there had been some objection to coloration of poisonous materials inasmuch as the pink, blue, or green powders might be especially attractive to children. Also, certain colors might be unacceptable to the pests to be controlled.

"We agree with your stand that some requirement of law is needed, but we all wish to consider every advantage and objection before phrasing a requirement. Your comments on the problem and suggestions towards attaining national uniformity would be greatly appreciated."

Fumigation for

MOTH

TOUGH JOB . . . ?

Not when you use

Larvacide

PHILIPPICIN

That super penetration you've heard so much about chalks up a quick finish for these deep-hidden — usually hard-to-reach pests — also for their egglife and larvae • LARVACIDE drives deep into upholstery, bedding, bundles . . . and that moth haven, the old family trunk, packed tight with Ma's good woolies and woolens • LARVACIDE is easy to use. No crocks to tip over; no threat to carpets and rugs; no fire or explosion hazard—and LARVACIDE's warning quality **cuts accident risk** • Write for folders telling **why** you may expect a Better Job with LARVACIDE. Address

Larvacide

CHLORPICRIN

tear gas fumigant. Cylinders 25-180 lbs. and handy 1 lb. Dispenser Bottles, each in sealed can, 6 or 12 to wooden case. Stocked in cities near you.

INNIS SPEIDEN & COMPANY

Established 1816

117 Liberty St., New York

BOSTON • CHICAGO

CINCINNATI • CLEVELAND

PHILADELPHIA • OMAHA

EXTERMINATORS CHEMICALS

RUMETAN

ZINC PHOSPHIDE

FOR RAT CONTROL

●

With thallium sulphate difficult to obtain, try RUMETAN . . . the ideal poison for Rats, Mice and Mole Crickets. Effective and economical. Write for details.

Pfaltz & Bauer, Inc.

EMPIRE STATE BUILDING, NEW YORK

Insects and Rodents In Relation to Public Health In War Time

(Continued from Page 10)

It is necessary to appreciate this possibility in planning an attack on a disease suspected of being insect-transmitted and thereby this attack on the disease becomes more logical and better directed.

Prevalence of Insect-borne Disease

Within certain limits, the geographical distribution of an arthropod-borne disease is governed by the distribution and prevalence of the insect-host. Consequently, an insect-borne disease can prevail only in districts where the insect-hosts are indigenous and environmental conditions are favorable for their continued existence. For example, Yellow Fever — which is spread by the **Aedes aegypti** mosquito—is a disease of the tropics where that mosquito is indigenous. However, in the days of clipper ships, Yellow Fever outbreaks occurred in Boston. The outbreak usually started in the middle of summer and always disappeared with the first frost. The disease began near the wharves and spread in the direction of prevailing winds. Apparently what took place was that **Aedes aegypti** mosquitoes were brought north from the tropics by the clipper ships and then bred in the open barrels of water which were conveniently placed on the wharves as protection against fire. The mosquito continued to survive so long as environmental conditions were favorable and spread the disease throughout the summer; but with the first frost the mosquito was killed and the outbreak of yellow fever ceased immediately. Subsequent outbreaks were due to re-importation of infected mosquitoes as the **Aedes aegypti** cannot survive New England winters.

Because the tropics and sub-tropics supply more favorable conditions for mosquitoes, mosquito-borne diseases are more prevalent in these regions. Conversely, louse-borne diseases occur most frequently in cold and temperate regions, as conditions produced by cold, namely the wearing of heavy clothing, crowding in houses for heat, and inadequate personal hygiene, favor the propagation and dissemination of lice. This has been well illustrated by the occurence of typhus in the concentration camps in Poland and in the armies on the Russian front.

Since no insect or arthropod is world-wide in distribution, no insect-borne disease is world-wide in distribution. Moreover, even if the insect-vector is present, the insect-borne disease spread by that vector need not be prevalent. A classical example of this is the absence of Yellow Fever in Asia. For an insect-borne disease to prevail, several conditions must exist:

1. Vector must be indigenous.
2. Vector must propagate under favorable environmental conditions.
3. Vector must be in sufficient number to spread and maintain an indigenous level of the disease. If the number of vectors is reduced to below this critical level, the disease cannot survive in epidemic proportions.
4. Susceptibles must be present.
5. The infected persons must be bitten by the vector which must have access to the human host.
6. Environmental conditions must be such as to permit vector to bite infected host and then the new to-be-infected host.
7. Vector must survive long enough to permit the parasite to undergo the extrinsic incubation period and then bite a new susceptible host.

If any one of these conditions is unfavorable, the disease ceases to be epidemic and the cycle is broken, and if broken often enough, tends to gradually disappear from the area. If. on the other hand, one of the factors which was missing is replaced, then the disease can be re-introduced, or assume epidemic proportions in an area where it was formerly endemic.

Where the cycle of transmission includes an animal-host of the parasite, the prevalence of the disease concerned is modified or entirely governed by the accessibility of the animal-hosts. It is important to note that the survival of the disease and any plan to control it must take into consideration this additional factor. It is this type of disease, namely, animal—arthropod—man that presents some of the most complicated and fascinating problems of epidemiology.

Insect-Borne Disease

Arthropods transmit not only diseases of man and other animals. but also diseases of insects and plants, such as the diseases of the cabbage butterflies and the various mosaic diseases of tobacco and tomatoes. Insofar as man is concerned, (Table I) [4] seven types of etiological agents are transmitted by arthropods. These are:

1. Helminths (round worms)
2. Protozoa
3. Bacteria
4. Bartonella
5. Spirochetes
6. Rickettsiae
7. Viruses

The Helminths are transmitted only by the Diptera: filariasis by mosquitoes, gnats (or punkies) and Gadflies; and onchocerciasis by Buffalo gnats.

Among the **Protozoa** are malaria spread by mosquitoes; Texas cattle-fever by ticks; African sleeping sickness by Tsetse flies; and Chagas' disease by ticks and assasin bugs.

The most important insect-borne bacterial disease, plague, is spread by fleas; Tularemia by ticks and Gadflies.

Oroya fever, a Bartonella, is transmitted by the Sandflies.

The Spirochetes of relapsing fever are transmitted by ticks.

Epidemic Typhus is spread by lice and the endemic form is spread by either lice, fleas or mites. Trench fever is also carried by lice. Rocky Mountain Spotted Fever, Fievre Boutonneuse, African tick typhus, Sao Paulo fever are all transmitted by ticks. Tsutsugamushi disease is spread by harvest mites.

Of the virus-insect-borne diseases, yellow fever, dengue, Equine encephalomyelitis and possibly Japanese Bencephalitis are transmitted by mosquitoes. Louping ill and Equine encephalomyelitis are also transmitted by ticks; the latter has been transmitted also by the cone-nose or assasin bugs.

Control of Insect-borne Diseases

Time does not permit for a complete discussion of the control of the various types of insect-borne diseases. I have already hit some of the high lights of control in my discussion thus far.

Therefore, in order to outline control procedures for insect-borne disease, I have selected a group of diseases which are transmitted by mosquitoes. This group, together with the louse-borne diseases, are perhaps the most important insect-borne diseases in War Time; and mosquito-borne disease is by far the most important in times of peace. Malaria is the most prevalent insect-borne disease. For complete and uniform terminology on malaria, I refer you to The League of Nations Bulletin of Health Organization, 9:131—246 No. 2, 1940.

The malignancy with which malaria can attack an area is illustrated by the spread of the disease in Brazil by the **Anopheles** gambiae. In 1937 and 1938 it caused an epidemic in one section which affected some 60,000 out of a total population of 70,000 and caused over 5,000 deaths. For detailed accounts of this outbreak and the work instituted to control the disease, I refer you to the Annual Report, Rockefeller Foundation, International Health Division for 1938 pg. 94—101.

And now briefly, Table II ([5]) as to the control of mosquito-borne disease, I wish to emphasize that adequate control must be based on one or more of the following procedures:

I. Control of the mosquito vector.
II. Protection of man and animal from the bite of infected mosquitoes.
III. Immunization of susceptibles.
IV. Removal of sources of infection of mosquito vectors by
  a. Isolation of cases
  b. Treatment of carriers
V. Prevention of entry of the mosquito vector and possible sources of infection into areas as yet unaffected by the disease.

All these methods are not applicable to every mosquito-borne disease.

I. **Mosquito Control** — Certain conditions are necessary before a mosquito-borne disease can become epidemic or reach a high endemic index. One of these conditions is the existence of a certain numerical relationship between the hosts, vectors and susceptibles. When this numerical relationship is upset by a reduction of the number of vectors, the disease ceases to be epidemic and rapidly declined either arithmetically or geometrically, depending upon the interrelation of many related factors. It becomes apparent that a moderate reduction in the number of mosquitoes below the critical level will markedly reduce the prevalence of the disease in an area where there are many immunes, but in a region with many susceptibles, the reduction below the critical level must be much greater. This concept was developed by Roses who applied it to malaria. Carter and Gorgas applied it to yellow fever.

The bionomics of mosquitoes are such that control measures must be designed to eliminate or control the larvae or the adults. The measures which are most effective in any area depend upon the local factors and upon the genus and species of mosquitoes concerned. It is impractical and uneconomical to attempt to control all mosquitoes. The control measures must be directed against that species which it is desired to reduce below the critical level. Therefore, in order to insure effective control measures, it is important to understand the bionomics, breeding habits, and seasonal and geographical distribution of the species that are concerned with the transmission of the disease. Since local circumstances vary, it is necessary that a mosquito survey [6] be made before control measures are introduced into a new area for the purpose of controlling mosquito-borne disease. Even in controlling mosquitoes as a nuisance, it is necessary to determine their bionomics before an eco-

nomical and efficient nuisance control can be expected.

Mosquito control has been effective in malaria and yellow fever. There has been considerable less experience in the effectiveness of this method in dengue, but since the principal vector of this disease is the same as for yellow fever, there is every reason to believe that mosquito control will prove just as effective. In filariasis, this method has also proved to be effective where it can be applied. To date, there has been no notable effort to control the vectors of equine encephalomyelitis. Theoretically, this method should be effective; but the natural vector of this disease has not yet been determined, and epidemiological and entomological investigations are needed before this method can be applied. The collection of this data is the primary objective of epidemiologists.

II. **Protection from Mosquitoes** — Effective protection from the bites of mosquitoes can be accomplished only under very limited conditions, especially in combat. Screening and avoidance of unnecessary exposure are the methods most effective. Spraying in houses, the application of mosquito repellants and swatting of adult mosquitoes are adjuvants. If this method were effective, animals and man would necessarily have to remain behind screens at all times. Since this is a physical impossibility, the protection against mosquito bites is only partial. This method is about equally applicable in all mosquito diseases; the differences are dependent upon the habits of the adults of the species concerned.

III. **Immunization of Suspectibles**—Specific immunization has proved effective in yellow fever. It is, however, not yet available to the public in all endemic areas. Although the vaccine is a live, attenuated virus, there has been no resumption of virulence in over two million vaccinations performed in Brazil. Whitman has demonstrated that mosquitoes which bit vaccinated persons did not infect monkeys on subsequent biting. Unfortunately, immunity is temporary and annual revaccination is required.

In equine encephalomyelitis [7 8 9] a vaccine produced from formolized virus grown in chick embryos, has proved effective in the protection of horses. As yet, this vaccine is not applicable to man, except for laboratory workers, due to severe reactions which have been encountered. Moreover, the risk of exposure to the disease has been so small that community immunization has not been indicated. Vaccination of horses must be repeated annually as immunity is temporary. Mohler attributes the decreased incidence of this disease in 1939, in part, to the vaccination of horses.

There is no specific immunization against the other mosquito-borne diseases. The prophylactic use of quinine and atabrine in malaria is an attempt to destroy the plasmodium as soon as it is introduced into the blood stream.

IV. **Removal of Sources of Infection** is effective only to a limited extent. Cases of the disease, with the infecting agent in the circulatory blood, may act as foci of infection for vectors. Therefore, it is, theoretically, good preventive medicine to isolate these patients in mosquito-proof quarters. Except for malaria and filariasis, which are, respectively, due to a protozoan and a helminth, the remainder of the mosquito-borne diseases are due to a virus which remains in the blood stream for a very short time, and which, in many instances, disappears from the blood stream soon after the disease manifests itself.

Malarial gametocyte carriers are the foci of outbreaks of the disease in new areas. Filariasis is often symptomless. As filaria may remain in the blood for prolonged periods, these carriers may act as sources of vector infection. Malarial carriers may be eliminated by adequate treatment, but filarial carriers remain permanent, for there is no known effective drug therapy in this disease.

V. **Prevention of Entry into New Areas**—This is a method which is applicable to all infectious diseases. The principles of isolation and quarantine are utilized in every community. In the case of certain diseases, especially those with a wide host selectivity, the prevention of the spread of a disease becomes more difficult. This feature is well illustrated in the case of yellow fever. The disease was apparently controlled by the use of the usual methods and isolation and quarantine on a community basis. Suddenly, it became apparent that jungle yellow fever was due to the persistence of the disease in other hosts and vectors.

Equine encephalomyelitis has an even greater host selectivity. Its spread may be due to vectors or hosts. Since the hosts include animals and birds, the geographical limitation of this disease becomes a difficult problem.

Malaria and filariasis are usually spread by hosts who are not known to be infected. In modern civilization and rapid transportation, it is practically impossible to eliminate the travel of such individuals.

SINCE J-O 1874

PHOSPHOROUS PASTE

FOR ROACHES and RATS

J-O PASTE (Type "O"): Out of our 69 years experience, we offer this Phosphorous Paste to meet every need. Consider these five advantages: (1) Type "O" Paste remains soft for months after application; (2) It embodies an attractive lure for roaches and rats; (3) It does not form a hard shell, remains penetrable; (4) It is miscible with water in all proportions; (5) It is unexcelled for the large specie of roach (American, etc.) and many different types of pest control work.

J-O PASTE (Regular): For the small specie of roach (German, etc.) J-O Regular Paste is unexcelled, and has been used for this purpose with outstanding success for the past 69 years.

Both types of J-O Phosphorous Paste used extensively for elimination of rats.
Write for Price List

JOHN OPITZ, INC.

50-14 39th Street Long Island City, N. Y.

Manufacturers of Exterminating Products Since 1874

POWCO BRAND
REG U.S. PAT. OFF

PYRETHRUM PRODUCTS

● *"Killing Power— That's the Thing"*

POWCO BRAND products are sold *only* to insecticide manufacturers and Pest Control Operators.

JOHN POWELL & CO.
114 East 32nd Street, New York City.

Conclusion—Insofar as military personnel [10] are concerned with control of insect-borne diseases, it is well to bear in mind that these diseases are likely to occur in endemic areas wherever there are natives. In malarial regions, through which the army must travel for example, the mosquitoes about villages will be found to be infected. Therefore, in order to prevent malaria, it is well to establish military camps beyond the flight distance of the mosquito vectors. For example, if it is known that the usual flight distance of the local malaria vector is 7 miles, then the military camp should be established approximately 10 miles from the village. In this way, even if the soldiers are bitten by the Anopheles mosquito, they are not infected because the mosquito in turn will be free from the disease. This freedom from infection in mosquitoes, of course, will be temporary and moving the camp to a new location must be considered as soon as the disease begins to make its appearance among the men. This periodical movement of the military personnel to a new location will prevent a substantial portion of malaria under these circumstances.

Similarly, it is important to know the bionomics of any vector concerned with the transmission of the disease, if the disease is to be effectively prevented or controlled. For example, it is a well-known fact, that some mosquitoes will bite in the shade and others in sun-light or only at twilight. If proper instructions are given to the soldiers, a substantial decrease will result. In landing on the shores of a certain tropical land, a large portion of the men were infected with malaria. Landing at twilight, they did not take the necessary precautions. In that area, there was a twilight-biting species. The wearing of nets by the men and the use of mosquito-repellants would have prevented much of the disease. These same considerations apply to the transmission of disease by other vectors.

Rodents and the Transmission of Disease

Rats are world-wide in distribution. The number of rats infecting any particular area is limited only by the food supply and the opportunities to nest. Lantz [1] estimates that starting with one pair of rats breeding three times a year, with an average litter of ten and without deaths, the increase amounts to over 20,000,000 rats at the end of three years. Rucker carrying the figures to five years obtained 940,369,969,152 rats. In addition to the seasonal migration of rats from country to the city in winter, and from the city to the country in summer, there are migrations of long distances. Rats have been known to cross rivers in large hordes. The transmission of diseases by rats may, therefore, result from seasonal or mass migrations from one part of the country to another, or from one continent to another, or on board vessels.

Because of the greater knowledge of my audience as to the method of rat control, I shall make no mention of any of the methods employed by rat exterminators except to comment upon one, namely, the use of the so-called "bacterial rat virus." Usually the rat virus consists of the bacillus of mouse typhoid (B. typhi murium) or of the para-typhoid bacillus, type B., or the Bacillus enteriditis of Gartner. All of these organisms have been associated with cases of human illness. Rosenau [11] makes the following statement: "The claim that these rat viruses are harmless to man needs revision, in view of the instances of sickness and death reported by various observers. The pathogenicity for man depends upon the virulence of the culture, the amount ingested, the nature of the medium in which it grows, and many other factors." Topley and Wilson (12) state the following: "A number of outbreaks are on record in which the infection has been traced directly or indirectly to the use of virus preparations." For further reference to the danger of using rat viruses, I refer my listeners to these two authorities.

Fluorides are often used by exterminators for all types of household pests, including mice and rats. Since fluorides in small doses (5 to 10 gms.) [13] may be fatal to humans, considerable care must be taken in the use of this poison even by professional exterminators. In the hands of the people, it is positively a dangerous material.

Not long ago an outbreak occurred in a Pacific Coast state institution for mental patients. A barrel of white fluoride was dipped into by mistake under the impression that it was flour. This mistake resulted in a great deal of illness and much death. Fluorides should, therefore, be colored to properly identify them.

About two years ago in New Bedford, a discharged employee decided to "get even" with his employer and put Sodium Fluoride into corn muffin batter. Fortunately, the amount which he put into the batter was so large that the poison acted an as emetic and the people who ate the corn muffins vomited all the poisonous material and thereby avoided possible death.

Fluorides should not be used by the public under any circumstances, nor should fluorides be used in kitchens or other places where food is handled—even by exterminators—unless utmost precautions are taken.

The rat is a factor in the spread of disease mainly because it serves as a host for the rat flea and as an animal reservoir of plague and endemic typhus fever. It may be concerned in the transmission of other diseases by mechanically transferring the causative organisms from waste materials, such as human excreta, to the food of man. Rats may be carriers of intestinal parasites, particularly tapeworms. They are also frequently infested with **Trichinella spiralis** and are a factor in transmitting the infestation among hogs.

The rat is also a carrier of the **Leptospira icterohaemorrhagiae**, the causative agent of infectious jaundice, and may transmit the disease to man by contaminating the food with excreta containing the leptospira. The etiological agent of the ratbite fever (**Spirillum minus**) is transmitted to man by the bite of a rat.

Rats and mice play an important part in the causation of food poisoning by salmonella organisms, which are closely related to paratyphoid. Mice are also responsible for the spread of the virus of lymphocytic choriomeningitis.

Let us consider these diseases in the order which I have named them above.

Plague

Although the rat does not directly transmit the plague to man, he is the reservoir of the disease and during periods of national and international turmoil and the consequent relaxation of sanitary standards there is a transmission of plague from rats to man usually through the median of fleas. It is a well-known fact that as soon as a rat dies and his body cools, the rat fleas will attach themselves to the first warm body that may be available. In this way, rat fleas transmit the disease from the plague-killed rat to a susceptible person and once the disease is started in humans the pneumonic phase may set in anytime; and from there on the plague may be spread from one individual to another by means of the respiratory discharges. It is a well-known fact that the rat flea may convey plague infection to several species of rodents such as the ground squirrels.

The clinical manifestation of plague in rats is important to men who may be concerned in trapping them. It is generally stated that plague-infested rats stagger about with a drunken gait, lose fear of their natural enemies and are readily captured. Rats experimentally infected show no marked manifestations of illness until shortly before death, when they become quiet, crouch in the corner of the cage, and try to hide. It is rather surprising that comparatively few dead plague rats are found in regions where the disease is endemic. Rats may be infected by the ingestion of the infected material as well as by the rat flea.

In the United States plague-infected rats have been found repeatedly along the west coast. The native squirrel and other native rodents in California and east of the Rocky Mountains are infected with plague. The squirrel flea which is found on the four species of the ground squirrel in California will attack man under the same conditions as will the rat flea. There is, therefore, danger in hunting squirrels and other rodents in areas where they are infected with plague. The prevention of plague, therefore, is reduced to warfare against rats and fleas and other infected rodents. The prevention of the entry of plague into vessels and airplanes which may come from New England lies in the quarantining of vessels and airplanes which may come from areas where plague is prevalent. This quarantining of possible infected vessels and planes is carried out by the United States Public Health Service. Plague, however, may infect rats for years before any human cases occur. Only when there is a rather extensive plague epizootic amongst rodents are human cases likely to appear.

Typhus Fever

In the present world conflict typhus fever has already reached epidemic proportions. Epidemic typhus is a highly fatal disease caused by Rickettsia organisms and it is usually spread from man to man by the body louse. However, there are several different types of typhus fever prevalent throughout the world. In the United States, the endemic or murine type of typhus is a serious problem in the southern states. About 90 per cent of the cases have been reported from Alabama, Texas and Georgia. This type of typhus received the name "murine" from the discovery that the natural reservoir of the disease is in rats. In 1926 Maxcy made important epidemiologic studies which eliminated the possibility of louse-transmission of typhus in the southern portion of the United States. In 1931 Dyer and his associates obtained murine typhus from fleas of rats caught in Baltimore. Other workers isolated murine typhus

FUMIGATOR: College education, 17 years experience, fumigating with HCN and Chlorpicrin gases. Capable of managing—fine service salesman. References exchanged. Draft Exempt.

B-33 PESTS.

from the brains of rats captured in a prison in Mexico City. It has been since demonstrated that the infection is passed from rat to rat by both rat fleas and by the rat louse (**Polyplax spinulosus**). The disease is transmitted from rat to man by means of these exoparasites. Zinsser believes that the infection is then spread among humans by the body louse. This type of murine typhus has been reported from many parts of the world and from areas where the other principal type of typhus exist concomitantly.

The classical or epidemic type of typhus which is now prevalent in Europe is usually spread from man to man by the body louse. It is now overrunning the eastern portion of Europe and has penetrated into the central and western part of Europe, extending southward to Turkey and northern Africa. England is prepared to meet the problem of this disease. Our American forces in Africa are provided with glass ampoules of methyl bromide in order to delouse their clothing. The spread of typhus in a population is directly proportional to the degree of louse infestation. In winter, louse infestation is higher because of the lack of bathing and because of the crowding to keep warm. It is therefore, to be expected that typhus will play a greater role each winter as the war continues and as sanitary facilities decline. It is believed that outbreaks of typhus originate either from infected rats or from human cases or carriers. Typhus killed many of Napoleon's men and it is no doubt a menace to the armies in Russia at the present time. So long as New Englanders can take a bath once a week and thereby remain louse-free, there is little danger of an outbreak of typhus even though there may be a rather heavy infestation of rats. The control of epidemic typhus is based on control of lice, whereas the control of endemic typhus depends primarily on the control of rats.

Infectious Jaundice

Infectious jaundice, [11] or Weil's Disease, is caused by **Leptospira icterohemorrhagiae.** The organisms are found in the blood, urine, and feces of rats which constitute the animal reservoir of the disease. Examination of rats collected during surveys indicate that about ten per cent of the rats are infected. This disease has a worldwide distribution but is most common in Japan and Egypt. The spread of the disease is facilitated by insanitary conditions, especially where there is prolonged contact with wet soil in the presence of crowding and rats. The leptospira gain access to the body through water and food infected by the urine and feces of rats or man. The disease is prevalent in New England. It has also been reported in small outbreaks among long-shore men and other workers who are apt to come in contact with wharf areas, where heavy rat infestation is likely. The control of the disease here and among the troops abroad is based on the protection of the food and water supply from rats. Infection of man may occur by ingestion of the infested material or by contact of infected soil or water, as the leptospira can penetrate the skin. Shoes should be worn, especially on wet soil where the infection is known to exist. Boiling temperatures are sufficient to kill the organism.

Trichinosis

The three most important hosts of **Trichinella spiralis** are man, hog, and the rat. The infestation is spread by one animal eating the flesh of the other. Trichinosis is very common among rats; they become infected by eating each other, by eating scraps of pork in garbage or in the refrigerator. Hogs become infected by eating rats and garbage containing pork scraps. The rat therefore plays a role in infecting the hog, which in turn acts as a source of infection for man.

Other Parasites

Rats and mice may harbor at least eleven species of intestinal parasites which occur in man. Only a few are of importance; these are: **Hymenolepis nana**, or dwarf tapeworm, **Hymenolepis diminuta**, or tapeworm of rats and **Lamblia intestinlis**, a flagellate protozoan. Several other diseases may on rare occasions be spread by rats and mice, amebic dysentery by both rats and mice, and through mechanical transfer, typhoid and other infection from human excreta or sewers to food.

Rat-Bite Fever

Rat-bite fever is a rare and curious infection sometimes following a rat bite. The causative organism is probably a spirochete found by the Japanese, **Spirocheta morsus muris**, and has been isolated from the blood of rats and also in human cases. It is not found in the saliva of rats and is supposed

DEPENDABLE SAFETY for Pest Control Operators

Pest control operators that are now using Acme No. 4 FULL VISION Gas Masks, know that these masks are dependable, and that operators receive maximum protection. The flat Safety Glass Lenses, with Non-Distorted FULL VISION, aid in speeding up their work, and providing protection against gases with which they operate.

For best results always specify type of gas being used when ordering Canisters. If you are not using Acme Gas Masks, write for Folder PM-387 today, and prices.

ACME PROTECTION EQUIPMENT CO., INC.
Manufacturers of Respiratory Protective Devices
3616 LIBERTY AVENUE PITTSBURGH, PA.

Prepared to Kill?

Prentiss Pyrethrum Products with high **Pyrethrins** content are your best guarantee of dependable **Killing Power.**

Prove to yourselves that **Prentiss Pyrethrum Products** can be relied upon for **High Killing Power at a Minimum Cost.** Write for samples and prices on—

- CLARIFIED PYRETHRUM No. 20
- HIGH TEST PYRETHRUM POWDERS
- POWDERED RED SQUILL
- POWDERED DERRIS ROOT

Write us for information concerning our SPECIAL POWDER which may be used in combination with SODIUM FLUORIDE as a contact insecticide.

R. J. PRENTISS & CO., INC.
80 JOHN STREET NEW YORK

to be transmitted during the bite by blood coming from wounds of the gums. Other infections may follow rat-bite, such as **Streptothrix muris ratti**, these are even rarer than the spirochetal infections.

Lymphocytic Choriomeningitis

Lymphocytic Choriomeningitis is an acute disease of man caused by a specific virus. Two forms of the disease are manifested. In the milder form, there is no apparent involvement of the central nervous system and the patient has an apparent attack of Grippe or influenza. In the more severe form this period of grippe is followed by a period of sustained fever, intense headache, and the usual manifestations of meningeal involvement. The disease is rarely fatal and recovery is complete without residuals. Infection is acquired from close contact with mice. Cases have been reported from homes heavily infested with mice, and among people who have handled trapped mice. A variable percentage of mice are infected in various cities in the country. In California, an outbreak of this disease was confused with an outbreak of infantile paralysis. In Boston, several of the cases came from the same section of the city and it is believed that there is a form of the disease among mice. Wild mice captured in various parts of Boston, including the Harvard Medical School, were found to be infected to a variable percentage.

The manner of transmission of the virus from the mouse to man is not known. The virus may be transmitted by an unrecognized exoparasite of the mouse, or it may penetrate the skin of people who handle the dead mice. It is not known whether the infection may be acquired by the ingestion of infected material. Cases of Lymphocytic choriomeningitis have been reported from all parts of the country and the world. The disease is not serious and apparently a substantial percentage of people have had the disease in an unrecognized form as is demonstrated by the presence in the blood of neutralizing antibodies to the virus.

Food-Borne Outbreaks

Recent evidence collected in various states, including New England, has revealed that about one-third of all food-borne salmonella infections are derived from animals, principally mice and rats. It is becoming a routine procedure to type all para-typhoid and salmonella organisms to determine their source before expending time and effort in attempting to find human carriers, as it becomes at once apparent that if the salmonella is of animal origin, the looking for a human carrier is time wasted. The food becomes infected by the urine and feces of mice and rats. The frequency of rodent "typhoid" varies considerably from place to place. Mice and rats may be suffering from a chronic form of the disease, or may not show any obvious symptoms of illness, and these animals may infect exposed food by their dropping. The control of this type of food-infection is based on control of rats and mice. The covering of all cooked food by adequate mouse-proof covers, and the thorough cooking of other foods are other effective means of control. Under war conditions it is quite probable that there might be an increase of food-borne outbreaks due to infection of the food by rodents under insanitary conditions.

Control of Diseases Associated with Rodents

As in the control of disease transmitted by insects or arthropods, so in the control of diseases associated with rodents, all measures must be based upon the type of disease covered, upon intimate knowledge of the vector concerned, and the effectiveness of the available measures under the given circumstances.

The control of plague is based on two measures: (1) The control of rats and any other rodents that may be concerned, and thereby eliminating the arthropods that are responsible for transmitting the disease from rodents to man; (2) The prevention of spread of the disease from man to man either by open lesions or by respiratory discharges. Fortunately, there is now available vaccine for immunization against plague.

The control of typhus is similarly based upon the control of rodents, but even more importantly upon delousing measures. The control or prevention of Leptospirochetosis has already been discussed. Rats are important in trichinosis in that they act as sources of infection of hogs which eat the infected rats. Here partial prevention of trichinosis may be achieved by excluding rats from piggeries. Rats may similarly transmit other parasites to hogs or directly to man, but this is a rare phenomenon. The infection of man by the spirochetes of rat-bite fever or other infective agents are likewise rare. The control of lymphocytic choriomeningitis must be based on the control of mice, the prevention of contamination of food, and cautious handling of trapped mice. Food-borne infections from rodent sources are again preventable by adequate rat-proofing methods and the control of the rodents.

Summary

With the involvement of the United States in war, all of us became acutely concerned with the fate of our nation. History is full of accounts of disease and pestilence during war times. Three types of disease have played important roles in the past. They are venereal diseases, respiratory diseases and diseases due to insanitary conditions. This latter group includes the diseases which are spread by insects and by rodents. Malaria, yellow fever, plague and typhus are the most important war diseases spread by insects and rodents.

The characteristics of insect-borne diseases are discussed in detail together with methods of control. The relationship of insect-borne disease to rodents is emphasized and the role of the important insect-borne and rodent-borne diseases is discussed in detail. It is expected that malaria and typhus will play more important roles in this war than they already have. Yellow fever and plague are additional problems which we must be prepared to meet.

This paper is restricted to those war diseases which are insect-borne and those which are to some measure spread by rodents. Many rodents including the rat, mouse and squirrel are concerned with the spread of disease. The rat, however, is of importance in the spread of disease; namely, because it serves as a host for the rat flea and as a reservoir of plague and endemic typhus fever. It is concerned in the transmission of other diseases by the mechanical transfer of the infective organisms from waste materials, such as human excreta to the food of man. Rats are carriers of intestinal parasites, particularly tapeworms. They are also frequently infested with Trichinella spiralis and are a factor in transmitting the infestation among hogs. The rat is also a carrier of the Leptospira icterohaemorrhagiae, the causative agent of infective jaundice, and may transmit the disease in man by contaminating the food with excreta containing the leptospira. The infectious agent of rat bite is transmitted to man by the bite of a rat. Rats and mice play an important part in the causation of food poisoning by salmonella organisms, which are closely related to paratyphoid. Mice are also responsible for the spread of the virus of lymphocytic choriomeningitis.

References

1. Getting, Vlado A. Civilian Public Health Problems in Wartime. New Eng. J. Med. 228:1-4. '43.
2. Dunham, George C. Military Preventive Medicine. Army Medical Bul. No. 23, Carlisle, Pa., '38.
3. Councell, Clara E. War and Infectious Disease. Public Health Reports 56:547-573, Mar. 21 '41.
4. Virus and Rickettsial Diseases. Harvard School of Public Health Symposium Volume. Harvard U. Press, Cambridge, Mass. '40.
5. Feemster, Roy F. and Getting, Vlado A. Survey of Mosquitos of Mass. Mass. Dept. of Public Health. Final Report '40.
6. Edited by Getting, Vlado A. Mass. Mosquito Survey 1939. Training Course for Field Personnel. Mass. Dept. of Public Health.
7. Getting, Vlado A. Equine Encephalomyelitis in Mass. New Eng. J. Med. 224:999-1006, '41.
8. Feemster, Roy F. and Getting, Vlado A. Distribution of the Vectors of Equine Encephalomyelitis in Mass. Amer. J. Public Health Vol. 31, No. 8, Aug. '41.
9. Feemster, Roy F. and Getting, Vlado A. Special Report of the Dept. of Public Health Relative to Varieties and Prevalence of Mosquitoes in the Commonwealth. Dec. 1940. Wright & Potter, Boston.
10. Dunham, George C. Military Preventive Medicine. Army Medical Bul. No. 23, Carlisle, Pa. 1938.
11. Rosenau, Milton J. Preventive Medicine and Hygiene. Appleton, N. Y. C. 1942.
12. Topley, W. W. C. and Wilson, G. S. The Principles of Bacteriology and Immunity. Wm. Wood & Co., Baltimore, Md. '38.
13. Wood & LaWall. U. S. Dispensatory. 22nd Centennial Edition. Page 1384. J. P. Lippincott Co.
14. The control of Communicable Diseases. Report of a Committee of the Amer. Pub. Health Assoc. Reprint No. 1697. Public Health Reports (Revised) 1940).

NAIDM Mid-Year Meeting Locale Changed from Toronto to Cleveland

Owing to the fact that the Royal York Hotel, Toronto, Canada, where it had been planned to hold the regular mid-year meeting of the NAIDM on June 7 and 8, has been taken over for that period by the Canadian Government for a Munitions Conference, the place of meeting has been transferred to the Hotel Statler, Cleveland, Ohio. Dates remain the same.

"Now and then a civilian gives me a lift; buys me a drink. When I thank them, they usually reply, 'Well, it's the least we can do for you fellows in the service.' I don't care about the lifts, about the drinks. Not much, certainly. What I do care about is that these civilians try to plan a world which discourages war, that they rid themselves of prejudices of an antisocial character. It's little comfort to fight for a drink, a lift, a glad hand. What I want is that the future is free of war. I don't want anyone to feel indulgent toward a young lad because he may be killed . . ."

—From a Coast Guardsman's letter.

Note of Caution

From now on no one is authorized to accept new OR renewal subscriptions to "Pests." Play safe; send all subscriptions, new OR renewal, direct to Pests, 512 East 14th Street, Kansas City, Mo. Your cooperation will be appreciated—it will also save misunderstanding all around.

Effects of High Temperature on Several Household and Storage Grain Pests

E. E. KENAGA and F. W. FLETCHER,
Biochemical Research Laboratory, The Dow Chemical Company, Midland, Michigan

It is well known that insects are able to continue their life activities over a considerable range of temperature. It is also true that various species react differently under a given set of temperature conditions. An interesting example of the effects of a relatively high temperature on various test insects was noted in our laboratory. The temperature was increased from a normal of 80° F. to 105° F. over a period of 64 hours. The relative humidity, which is normally about 55 per cent, dropped during this period to approximately 40 per cent. At that time 17 different species of household, stored product, and various other laboratory test insects were being reared in the laboratory. Table I illustrates the approximate mortality and other effects that occurred in these species when exposed to the above variations in temperature and relative humidity in the laboratory.—10-14-42.

—*Journal of Economic Entomology.*

Table 1.—Effects of a temperature change from 80° to 105° F. on laboratory test insects.

Insect	Per Cent Mortality (approximate) Egg	Immature Stages	Adult	Remarks
Blattella germanica L.	0	0	0	All stages unaffected.
Periplaneta americana Fab.	—	40	99	1st and 2nd instars active, larger instars moribund. The larger the insect the greater the mortality.
Troctes divinatoria Mull.	—	0	0	All stages apparently unaffected. No counts made.
Cimex lectularius L.	0-?	0-?	0-?	Same as *T. divinatoria.*
Oncopeltes fasciatus Dall.	20	40	80	All stages desiccated. Eggs hatched 3 days early.
Attagenus piceus Oliv.	—	50	90	The larger the larva the greater the mortality. Cultures where crowding occurred showed a high per cent kill.
Trogoderma versicolor Creutz.	—	70	90	Same as *A. piceus.*
Demestes sp.	—	50	50	Larvae slightly dessicated.
Oryzaephilus surinamensis L.	—	100	100	All stages killed.
Laemopholeus minutus Oliv.	—	0	0	All stages unaffected.
Mylabrus sp.	—	0	0	All stages unaffected.
Sitophilus oryzae L.	100	100	100	All stages killed.
Cynaeus angustus Lec.	—	90	50	In the moist culture all stages were killed and in the dry culture only a few of the larvae were killed.
Tribolium confusum J. du V.	0	0	0	All stages unaffected.
Rhizopertha dominica Fab.	0	0	0	All stages unaffected.
Tineola bisselliella Hummel.	100	90	100	Only a few large larvae survived.
Ephestia kuehniella Zell.	100	100	100	All stages killed.

NO SHORTAGE AND One OUTLASTS 400 DRY CELLS

Dry cells Drastically Restricted—and flashlights more important than ever. Don't worry; use IDEAL *Rechargeable* Flashlight Storage Batteries and never run out of batteries!

IDEAL RECHARGEABLE IDEAL Flashlight STORAGE BATTERIES

One IDEAL *Rechargeable* Storage Battery can outlast 400 dry cells—and give better, brighter, steadier, more dependable light. Your flashlight dry cells get steadily weaker, until they must be thrown away. But you *recharge* the IDEAL Storage Battery again and again, restoring your battery and your bright light. Charger plugs into any light socket.

Conserve Critical Materials. In IDEAL *Rechargeable* Storage Batteries, 5½ oz. of lead can replace approximately 68 lbs. of carbon, zinc and other vital materials used in 400 dry cells.

Reduce Flashlight Battery Costs as much as 75%. Equal in size to two 1¼ inch size D dry cells. GUARANTEED. Thousands in Use! Prompt Deliveries.

Write for Bulletin FBB 1242.

IDEAL COMMUTATOR DRESSER CO

5208 Park Avenue Sycamore, Illinois

Sales Offices in all Principal Cities

GREATER *Kills* with CERTOX

REG U. S. PAT. OFF.

Rodent Seed, Ant Jelly, Arsenic, Carbolic, Pyrethrum, Cresylic, Red Squill, Derris Powder, and other effective chemicals that do a thorough job for the Pest Controller. The quality of CERTOX products remains unaffected by the national emergency. Prices, too, are near normal.

YOUR GUARANTEE:

All CERTOX products are manufactured according to exacting specifications under personal supervision of I. H. LUTTAN, B. S. A., Entomologist.

SPECIAL CONTRACT PRICES Available to Cover your Annual Needs.

YORK CHEMICAL CO.

Suppliers of Complete Exterminating Chemicals.

424 West 18th Street, New York, N.Y.

Additional Patents Relating to Pest Control

By DR. R. C. ROARK.

2,303,313 (Dec. 1, 1942; appl. Jan. 8, 1941). **Garment Hanger.** Sidney M. Abbens, San Francisco, Calif.—This garment hanger is designed to hold moth balls.

2,303,458 (Dec. 1, 1942; appl. Dec. 23, 1940). **Powder Distributing Apparatus.** Milton H. Hermann and Sollie Hergott, Chicago, Ill.

2,303,683 (Dec. 1, 1942; appl. Jan. 15, 1941). **Insecticidal Composition.** Gerald H. Coleman and Fred W. Fletcher, Midland, Mich.—The Dow Chemical Company, Midland, Mich.—An insecticidal composition comprises as an active toxicant a mixture of a material of the class consisting of rotenone- and pyrethrin-containing plant extracts with a compound having the formula R-O-CnH2n-X wherein R represents an aromatic radical, X represents a member of the group consisting of chlorine and bromine, and n is an integer from 2 to 8, inclusive. Examples of these compounds are: Beta - (4 - bromo - phenoxy) - ethyl bromide; beta - (2 - chloro - 4-tertiarybutyl-phenoxy)-ethyl chloride; gamma - (4 - tertiarybutyl - phenoxy)-isobutyl chloride.

2,303,913 (Dec. 1, 1942; appl. April 11, 1941). **Dispenser for Disinfectants.** Leo C. Collinge and John H. Layman, Portland, Ore.—This dispenser drops a measured quantity of sanitary, cleansing or deodorizing liquid in the trap of a toilet bowl during each flushing operation.

2,303,981 (Dec. 1, 1942; appl. July 1, 1941). **Insecticide.** Edgar C. Britton and Frank B. Smith, Midland, Mich.—The Dow Chemical Company, Midland, Mich.—An insecticidal composition comprises as an active toxicant stable sulphur-dithiocyanate.

2,304,156 (Dec. 8, 1942; appl. Mar. 7, 1940). **Organic Compound and Process of Preparing the Same.** Max Englemann, Wilmington, Del., and Josef Pikl, Pitman, N. J. —E. I. du Pont de Nemours & Company, Wilmington, Del.—This invention deals with phosphonic acids derived from organic acylamido methylol compounds. An example is stearamido-methyl-phosphonic acid. These may be used for wetting agents, detergents, and softening agents; as mold inhibitors; and as moth-proofing or waterproofing agents.

2,304,555 (Dec. 8, 1942; appl. May 30, 1942). **Trap.** Frank Doverspike, New York, N. Y.—A rat trap is described.

2,304,593 (Dec. 8, 1942; appl. Oct. 2, 1940). **Birdproofing.** Julius Stanley Peles, New York, N. Y.—Wire in loops prevents pigeons from alighting on the ledges of buildings.

2,306,080 (Dec. 22, 1942; appl. Jan. 7, 1942). **Birdproofing for Starlings and Sparrows.** Julius Stanley Peles, New York, N. Y.

2,306,434 (Dec. 29, 1942; appl. Mar. 1, 1941). **Method of Applying Insecticides.** Lyle D. Goodhue, Berwyn, Md., and William N. Sullivan, Washington, D. C.—Claude R. Wickard, as Secretary of Agriculture of the United States, and to his successors in office —A process of fumigation comprises the two steps of (1) forming a relatively insecticidally inert aerosol by the incomplete combustion of organic material (2) subsequently volatilizing in the presence of this aerosol an insecticidal material.

2,307,163 (Jan. 5, 1943; appl. July 15, 1941). **Vermin Trap.** Evan Shea, New York, N. Y.—The opening to this trap is provided with means for imparting an electric shock to the entering insect to thereby cause it to fall into the enclosure.

2,307,482 (Jan. 5, 1943; appl. Mar. 3, 1941). **Insecticide.** Seaver A. Ballard, Berkeley, and Vernon E. Haury, El Cerrito, Calif.—Shell Development Company, San Francisco, Calif.—An insecticide comprises an unsaturated alicarbocyclic ketol having the carbonyl group in the ring and containing at least 10 carbon atoms. An example is diisophorone, which is effective against houseflies.

2,307,704 (Jan. 5, 1943; appl. April 10, 1941). **Benzal Octyl Cyanoacetate as a Pest-Control Agent.** William Moore, Stamford, Conn.—American Cyanamid Company, New York, N. Y.—An insecticide contains as an active ingredient benzal octyl cyanoacetate. A 100% control was obtained when a spray of 1-1000 dilution was used against the citrus red spider, Tetranychus citri.

2,307,775 (Jan. 12, 1943; appl. June 7, 1941). **Pest Control.** Albert L. Flenner, Wilmington, and Avery H. Goddin, Newark, Del.—E. I. du Pont de Nemours & Company, Wilmington, Del.—A mothproofing composition contains as an essential active ingredient N,N-dimethyl-n-octadecylamine.

2,307,844 (Jan. 12, 1943; appl. April 15, 1941). **Insect Lure.** Mivauooto McPhail, Honolulu, Territory of Hawaii—Dedicated to the free use of the People in the territory of the United States—A lure for the melon-fly (Dacus cucurbitae) comprises as its essential active ingredient a soap chosen from the group consisting of linseed oil soap and corn oil soap.

2,308,111 (Jan. 12, 1943; appl. July 10, 1939). **Octozone Generator.** Herman W. Schuette, St. Louis, Mo.

2,308,491 (Jan. 19, 1943; appl. Feb. 24, 1939). **Preserving Wooden Poles and Posts.** Edwin F. Conger, Staunton, Va.—The pole is impregnated under pressure with an aqueous solution containing chemicals in time reacting to produce insoluble preservative substances in the wood.

2,308,675 (Jan. 19, 1943; appl. Oct. 31, 1940. In Germany Oct. 10, 1939). **Diazoamido Compounds.** Heinrich Clingestein and Hans Schrum, Cologne, Germany—Winthrop Chemical Company, Inc., New York, N. Y.—These compounds are distinguished by their therapeutic activity in the tuberculosis infection of warm-blooded individuals.

2,309,335 (Jan. 26, 1943; appl. Jan. 31, 1941). **Esters of Hydroxypolyaryl Methanes and Process for Preparing Same.** Herman A. Bruson, Philadelphia, Pa.—The Resinous Products & Chemical Company, Philadelphia, Pa.—These products are useful as moth-proofing materials.

2,309,399 (Jan. 26, 1943; appl. Jan. 30, 1940). **Garment Storage Vault.** William R. Kohl, Glenview, Ill.—This garment storage vault is substantially seal-proof against all types of animals, insects, and conditions injurious to garments.

2,309,592 (Jan. 26, 1943; appl. June 22, 1939. In Germany June 23, 1938). **Method for the Production of Aqueous Solutions.** Richard Hueter, Dessau-Rosslau, Anhalt, Germany—"Patchem" A.-G. zur Beteiligung an Patenten und sonstigen Erfindungsrechten auf Chemische Verfahren, Zurich, Switzerland—A clear aqueous germicidal solution contains a phenolic disinfectant together with a quaternary ammonium compound. For example, six and two-tenths grams of p-chlor-m-cresol, 28 grams of piperidino acetic acid dodecyl benzyl amide hydrochloride, 8.0 grams of alcohol and 71.8 grams of water form a clear solution. This solution may be diluted to any desired degree even with hard water, and will remain clear continuing to yield a true solution.

2,309,616 (Jan. 26, 1943; appl. Nov. 2, 1937). **Ozone Generator.** Ben P. Bagby, Louisville, Ky., and Charles B. DeLano, Cleveland, Ohio—Ozone Development Corporation.

News From Washington

To Assign PD-1A Ratings

WPB Regional Office Will Act on Applications Up to $100

The Regional Office of the War Production Board announced on March 13th, that beginning March 15th, it will exercise its recently granted authority to assign preference ratings on PD-1A applications for restricted materials in amounts of $100 or less. This will apply to all such applications from the various WPB districts of the New York and Northern New Jersey region. Heretofore, all such applications have had to go to Washington for ratings.

This regional authority to assign priority ratings, at first to apply within the limitation of $100, is to be progressively expanded in order to increase decentralization procedure. After April 15, it was said, the regional office will have authority in cases up to $500. It is estimated that fully 60 per cent of PD-1A applications come within the $100 limitation.

Expansion of the decentralized procedure, it is estimated, will mean that the regional office will have final action in more than 80 per cent of all such applications.

Pig-Eating Rats: Mr. Holland, Termite and Pest Control, Sacramento, Calif., in reporting the successful extermination of 580 pig-eating rats recently, with more to go, states: "There was one case where the leg of one of the pigs was completely eaten off, though in most cases it was just the ears and tails. In two successive nights there were 17 small pigs carried off; 14 the next."

WHAT'S NEW IN PEST CONTROL-PERSONALS

George C. Pickhardt of the International Fumigating Co., Buffalo, N. Y., died on March 22 at a Cleveland hospital, where he had been laid up as a result of being hit by an automobile two months previous. He is survived by his widow, Caroline F. Rennard; four sons, Elmer P., Emile H., William G., Vernon C., all in the Armed Forces of the U. S., a sister, Mrs. Augustine Schilt, and a brother, Charles H. Mr. Pickhardt was 81 years old, and a respected member of the profession.

Our condolences to his family.

PCO—W. D. Bedingfield, owner of the B. & R. Exterminating Co., of Corpus Christi, Houston and San Antonio, Texas, and member of the NPCA, was awarded, in February 1943, an Army-Navy E Pen for outstanding proficiency in pest control work, at the Brown-Bellows and Columbia Construction Civilian Naval Camp, located at the main base of the U. S. Naval Air School at Corpus Christi, which specialized service has been in his charge since September 1940. Congratulations, Mr. Bedingfield! The Industry is proud not only of your accomplishment but feels itself honored vicariously, too.

Lt. Charles Denny, whose vocation in civilian life was that of scientific pest control in the city of St. Louis and who is currently a member of that greater United Nation's Army, destined to exterminate some deadly pests, writes the Secretary: "I know now why all the Army boys write postcards,—they won't give you time to write a letter." Lt. Denny, whose address is MDRP—MRTC, Camp Joseph T. Robinson, Little Rock, Ark., will be glad to hear from members of the Industry at all times.

Returns to Ohio State University: Recently recalled from the office of Agricultural War Relations of the U. S. Department of Agriculture, Washington, D. C., where he was serving, while on leave of absence from the Department of Zoology and Entomology of Ohio State University, Dr. F. L. Campbell, still on leave from the Department, is now working as executive assistant in the University Research Foundation. Succeeding Dr. Campbell in Washington, is Dr. C. C. Hamilton of Rutgers, with Dr. H. H. Shepard of the University of Minnesota assisting Dr. Hamilton.

Married: Barbara Eunice, daughter of Bart. W. Eldredge, chairman of the important NPCA Fumigation Committee, and Mrs. Eldredge, was married to Robert Gordon Watt of the Pan American Airlines, on Saturday, April 3, 1943, at Cambridge, Mass. While en route to Miami, where the couple will undoubtedly reside, they were met in New York by Helen and Bill Buettner who speeded them on their way south. Congratulations and best wishes to the newly wed Watts for a long and happy marriage.

H. D. HUDSON, founder and president of the H. D. Hudson Mfg. Co., Chicago, Ill., died in that city on March 21, 1943.

From Way "Deep Down in the Heart of Texas—Clap! Clap!" comes word that F. E. Shoop, manager, Texas Termite Co., who has been located in Wichita Falls for many years, is the proud—and who wouldn't be?—father-in-law of four sons, all of whom are in the Army. Family roll-call follows: Pvt. Hugh F. Garmany, married to Phyllis Ann (Shoop's eldest), is stationed at Camp Haan, Calif., member of an anti-aircraft unit; Corp. R. B. Griffith, husband of Edna Mae, is at Army Air Base, Walker, Kansas; 2nd Lt. Chas. Van Horne, Peggy Jane's husband, is a pilot, at Terrant Field, Ft. Worth, Texas; and 2nd Lt. John Christoff, married to Shoop's youngest, Laura Gail, is in the Army Air Corps, Randolph Field, San Antonio, Texas. And as if that weren't enough, Pvt. L. W. Stone, one of Shoop's employee-operators, is at Camp Addir, Oregon. Via grapevine we also learn that "Shoopy" is an expectant grandpop, if not an honest-to-goodness one by this time. Texans sure go in for things in a big way. Salutations to the patriotic Shoop family, and congratulations to them on their newest family arrival!

Impatience Cured: There was once a person who put a marble into a bottle every time he lost his temper. At the end of a year the man had collected sixty marbles, but he couldn't remember any of the incidents leading to a single tantrum. The realization that none of the incidents had been important cured the man of his impatience.

INSECTICIDES

Which do you need?

Super **FLUOREX V** White, Blue.

A FLUORINE INSECTICIDE

Stronger than Sodium Fluoride

SODIUM FLUORIDE, When Obtainable

STERILAN, a Dependable Mothproofing Powder

ARSENATE & ARSENITE OF SODIUM

CARBOLIC ACID CRESYLIC ACID

POISON SEED for Mice and Rats

RUMETAN for Rats and Mice

PYRETHRUM POWDER, When Obtainable

Write us and "get what you want when you want it"

AMERICAN FLUORIDE CORPORATION

151 WEST 19th STREET -:- NEW YORK, N. Y.

Phone: CHelsea 3-1266

"OPEN SEASON" FOR FUMIGATION ACCIDENTS IS HERE !

ADEQUATE INSURANCE PROTECTION IS AS IMPORTANT AS GUARDS AND WARNING SIGNS

Tomorrow's Policy Will Not Cover Today's Accident

PROTECTION and SECURITY

May Be Had Through Dependable

INSURANCE

FOR THE

PEST CONTROL INDUSTRY

Policies issued in REPRESENTATIVE AMERICAN STOCK COMPANIES operating in all states.

Public Liability *Workman's Compensation*
Auto Liability and Property Damage *Products Liability*
And All Allied Lines

Cooperating with National and All Local Pest Control Associations.

MEMBER NATIONAL PEST CONTROL ASSOCIATION

B. & D. A. WEISBURGER

1440 BROADWAY NEW YORK CITY

Specialized
Dependable Insurance Service Since 1915

Flyers get tips on what to do if lost in the jungle. The War Dept., announced recently its guide book, titled "Jungle and Desert" will be included in pilots' bail-out kits. It is printed on water-resistant paper and contains insect-repellent powder in the binding glue. On the question of edibles, the guide says termites can be eaten raw after the wings have been removed. Beetle grubs should first be boiled, fried or dried.

Delouser: After four years of research, Walter K. Angevine, M.D., Medical Officer of Washington, D. C., penal institutions, has discovered a means of putting pyrethrum into ointments which kill lice. This is important news, because typhus and some other infections may be transmitted by lice and other biting insects. Controlled tests on 8,000 prisoners in the jails of Washington, D. C., leave no doubt of the ointment's efficacy. Among one group of 1,504 cases treated, not one required a second application. The ointment, known as A-200, must be kept on the body no longer than fifteen minutes. It is washed off easily with soap and water, and it does not permanently stain the clothing or produce any allergic manifestations.

Davenport Rats Epicurean: Davenport, Iowa (A.P.).—Poisoned meat does not lure rats a pest control firm said in applying to the Rationing Board for steaks. The board sent the application to Chicago.

Termite Control: The half billion fence posts replaced by American farmers annually can now be protected from termites and decay by the trough method, a simple soaking process with chromated zinc chloride. This replaces the former treatment procedure employed by most farmers which used old inner tubes as part of the equipment.

The Co-Operator, house organ of the Co-Operative Club of St. Louis, March 30th edition, contains a thumb-nail sketch of the life of Thomas C. Raley, an executive of the Getz Exterminators, set-up of which is also described. Of humorous and related interest is the parody, set to the tune of "Three Blind Mice", which follows:

WORSE ONE

If you have pests
Don't let them rest
They multiply with zest
Send for Gątz
Just call for Tom Raley our good Co-Op
He'll give 'em the works and they'll blow
their top
One whiff of Getz and right down they'll
flop
For Co-Op Tom.

SECOND WORSE

Kill those rats
Slay those mice
Exterminate the bugs
Stop those lice
Tom Raley knows his pest control
He'll even rid your lawn from mole
Those Japs would even find their hole
Just like the mice.

Montreal Memos

(From One Yank's Notebook)

Some 14 PCOs from the States had sold themselves, also their associates and wives, on the idea that attendance at the First Canadian PCO Conference was a "must" item. Prospects: (a) a good conference, (b) a good time. Both objectives were reached, over-run, and duly consolidated.

Visitors were set back on their heels by the magnitude of the plant of the Universite de Montreal, by its ultra-modern construction, facilities, and equipment. It is said to be the world's largest educational institution in a single building. The planning was a revelation to those who have struggled to darken a lecture hall for pictures, to combine lectures with laboratory demonstrations, or to be seated comfortably while on the receiving end of the educational process. Press a button, and the blackout shades do their appointed job; push a blackboard aside, and there's a laboratory with all the gadgets. And the slide projectors are in focus, first time.

Efficient taxi service was provided by the Montreal firms. The consolidated fleet of service cars was on the job day and night, and never missed a PCO. The Montreal hosts spared neither time, manpower, rubber, or gasoline. Just what happened to service calls during the three day sessions is probably none of our business.

Montreal drivers have one quaint custom: swinging the car door wide open to signal a left turn. (Don't try it).

The language angle added to the gaiety of the gathering. The sessions were in English, but guest speakers (notably Charlie Pomerantz of New York City) were tipped off by none-too-well-meaning friends that the law required them to present their papers also in French. Pete Bohman's best effort resulted in "throw the horse out the window some hay". There were vocal souvenirs of Paris, Quebec, Oxford, Cockney, Vermont, Nasal, Midwest, and Brooklyn. And Bill Bomby, toastmaster and new president, was publicly accused of speaking Scotch with a French accent.

Then there was the "exchange" puzzle. Registrants from the States fared so well when settling for purchases that they were satisfied to let well enough alone, ask no questions which might re-open the subject. But Charlie Pomerantz is still trying to figure this one out: He gave a merchant a dollar, and got three oranges, plus one dollar in change.

For the first time on record, a Fumigation session was held "on location". The Government Station, housing vacuum and atmospheric chambers, provided an ideal setting for a fumigation clinic and interesting experiments with various types of gas.

It is correct to state that there was nothing "Mysterious" about the occasion—but only because of a recent change of firm name. But "Mysto" was much in evidence, both in service cars and other visible contributions, and the behind-the-scenes work and backing so generously provided by the brothers Maheu and their live organization.

The aggregate mileage rolled up by conferees must set some sort of record. Individual honors go to McLeod of Vancouver, whom many old timers had not seen since the Omaha convention. Only after consulting the atlas are we reconciled to the failure of Mrs. McLeod to come along this time, too.

Without any special effort to emphasize the War influence, it found expression in a thousand and one ways. The military representatives present—and just as eloquently the industry men absent; the changing nature of industry problems; the serious and co-operative attitude on all sides; all bring into wholesome relief a truly service industry, at its best in time of stress.

Universite de Montreal takes its place with Purdue, California, Louisiana, and Massachusetts State. And to the proved friends of our industry in the scientific fraternity must be added: Father O. Fournier, Professor E. R. Bellemare, and their associates.

The banquet, at beautiful Cercle Universitaire, was an impressive and wholly delightful event. Bill Buettner was guest speaker, and of course he was good. There is a rumor, however, that due to the religious background of the host institution and faculty, Bill has been admonished to draw his stories in the future from some source other than J. J.

Phosphorus Paste

10 lbs., $4.25; 25 lbs., $9.
50 lbs., $17; 100 lbs., $32.50.

For the extermination of rats and roaches.

PEST CONTROL CHEMICALS CO.

P. O. Box 37 *Write for Details* BUFFALO, N. Y.

"GOOD" DISINFECTANTS

Pine Oil Disinfectants Coefs. 3 and 4
Phenolic Emulsifying Disinfectants Coefs. 2 to 20
Soluble Cresylic Disinfectant
B.A.I. and Commercial Standards
Saponated Solution of Cresol
U.S.P. (Cresol Compound Solution)

All made under careful laboratory control. Phenol coefficients determined by LaWall and Harrisson Laboratories.

OTHER "GOOD" PRODUCTS

Insect Sprays
Cattle Sprays
Bed Bug Sprays
Agricultural Insecticides
Vegetable Oil Soaps
Liquid Soaps
Scrub Soaps (Liquid & Jelly)
Floor Wax and Polishes

BULK PACKAGES AND PRIVATE LABEL

JAMES GOOD CO.

Manufacturing Chemists—Since 1868
2121 E. SUSQUEHANNA AVE. PHILADELPHIA, PA.

LOCAL ORGANIZATION NEWS

Los Angeles District Pest Control Operators of California, Inc.

Monthly Dinner Meeting, Webster's Steak House, February 17, 1943

Meeting was called to order promptly at 8 P.M. by Chairman Beliveau.

After a few opening remarks the minutes were read and approved.

These committees were announced by the chair:

1 Program Committee—
Dave Rennie, Chairman.
Mr. J. E. McNatt
John Fobes

2 Membership Committee—
Hugh Smith, Chairman.
Cal Tracy
Maurice Darby.

The above two committees will be under the direction of the vice president.

Additional committees are:

3 Finance Committee—
Bill Hogan
J. E. McNatt
Ernie Harbor

4 Constitution and By-Laws—
Jess Miller

5 Sick Committee—
Roy Woodward to act as chairman and to delegate his committee from the different localities.

6 Legislation Committee—
This committee if necessary can be appointed later.

7 Insurance Committee—
Hugh Smith

All present introduced themselves and their affiliation.

It was suggested that identification buttons be obtained so that we might get better acquainted.

The names of L. J. Coburn, Jr., and R. G. Lent were submitted in application for membership.

Reports on the convention and conference were made by Messrs. Hogan and Miller. Both were a huge success.

The new president of the State, Mr. J. E. McNatt, was introduced and in a few words expressed a desire and hope for unity and cooperation in the industry.

Mr. Rennie reported on the changes in the State constitution and that there are now 4 directors in the south. There are at the present time 131 members in the PCO of Calif., Inc.

It was reported that the other association asks for no change in legislation this year. On this point we are all in absolute agreement.

A logical and well presented report was made by Mr. Williams, registrar of the state structural Pest control board, on the man power committee. His report was made in the absence of Mr. Loibl, chairman of the committee. A petition has been sent to Mr. Hopkins presenting the facts. It was also reported that the next examination will be given by the board on March 13th.

A discussion followed as to what extent the industry has been registered. Mr. Culton reported that he has been successful in getting deferment for key men in several companies. Mr. Gunn reported that we have a rating of AA5 order MR-251.

A committee on flashlight batteries is to be appointed.

Sick committee reported Cliff Tracy as having been down with a cold since the conference.

It was suggested to send the bulletin to members in the armed service.

Moved by Dewey, seconded by Burgin and carried, that we take a membership in the L. A. Chamber of Commerce.

Discussion of income taxes by Mr. Wintrode and Mr. Gage ended in a question and answer period.

It was suggested to have the next meeting at Webster's. Moved by Lee Williams, seconded by Burgin, and carried that a committee of 3 be appointed to select, or look into the possibilities of another meeting place.

Meeting adjourned at 10 P.M.

— THALLIUM SULPHATE —
Willing to pay the price for 1 lb.
This would be appreciated.
B-2 PESTS

FOR DISTINGUISHED SERVICE

On The Odor Front

When it comes to chemical warfare against obnoxious odors common to the basic ingredients of insecticides and other technical products, M M & R IS A VETERAN, cited many times for conspicuous service over and above the usual call of duty.

If your order of the day is, "A more positive deodorant or perfume oil at less cost" then M M & R can serve you well. We invite you to send us a pint or two of your unperfumed spray (or other technical products); with a notation regarding contents; and your requirements checked as follows: —

☐ **Neutralize odor without perfuming**

☐ **Neutralize odor and perfume**

☐ **Our budget is.....per gallon of spray**

There's more than one good reason to expect that the returned samples will satisfy you on every score.

MAGNUS, MABEE & REYNARD, INC.
SINCE 1895...ONE OF THE WORLD'S GREATEST SUPPLIERS OF ESSENTIAL OILS
16 DESBROSSES STREET, NEW YORK CITY • 221 NORTH LASALLE STREET, CHICAGO

Offices in Principal Cities • Canada: Richardson Agencies, Ltd., Toronto

1 plus 4 equals 5

One gallon **TERRATOX CONCENTRATE No. 225** makes five gallons of ready-to-use effective termite control solution when dissolved in four gallons of any light oil diluent

AND

One pound **TERRATOX CONCENTRATE No. 215** makes five gallons of ready-to-use effective solution when dissolved in water.

No. 225 can be used effectively in both wood treatment and ground control.

No. 215 is recommended for ground treatment only.

TERRATOX CONCENTRATES save you money in two ways: they cost less, and being in concentrated form, they save in freight charges.

Write for full information and quantity prices.

WOOD TREATING CHEMICALS CO.
812 Olive Street
ST. LOUIS, MISSOURI
SALES AGENTS FOR — MONSANTO CHEMICAL CO.

WRITE FOR THESE BOOKLETS

The latest helpful information service literature will be sent to you without cost or obligation. If, in addition, there are any particular pieces of literature offered by advertisers in this issue you are interested in receiving, either write them direct, or if you prefer, please send us such requests.

Please note, however, that you must request each booklet on a separate letterhead though they may all be mailed in one envelope addressed to Pests, 126 Lexington Avenue, New York City, N. Y.

GAS—HOT OR COLD?

Bulletin discusses the question which arises occasionally as to the advantage of a "hot" gas over "cold" gas, the hot gas being represented as hydrocyanic acid generated by the pot method and the cold gas being represented by the "canned" product, for example in the form of Zyklon Discoids. Bulletin also contains some helpful notes on gas mask canisters and bedbugs.

WRITE PESTS, A-C-68.

HOUSEHOLD SPRAY FACTS

Manufacturer's bulletin discusses Lethane's killing power, range of insect control, cost, chemical stability, spray formulas, etc.

WRITE PESTS—ROHM & HAAS.

PIGEON-PROOFING

Folder describes pigeon-proofing invention which manufacturer claims will completely and decisively eliminate the pigeon nuisance. In use by real estate companies, churches, government buildings, etc.

WRITE PESTS—STANLEY.

HIDDEN SOURCES OF INFESTATION

Bulletin outlines whys and wherefores of moth infestation due to improper insulating materials and suggestions to combat.

WRITE PESTS—A. C. No. 56.

FILM OF VALUE TO PCO

Circular describes a vivid action film of greatest value to every PCO and opportunities it affords PCO to build good will and better public relations.

WRITE PESTS—WIL-KIL.

TERMITE CONTROL

Folder discusses concentrates available for two distinct methods of termite control: (1) treatment of timbers in place with an oil solution, and (2) treatment of all soil around an infested building or area with either an oil or water soluble chemical. Issuing company states it specializes in all problems concerning wood-destroying organisms and also wood preservation and invites your inquiries thereto.

WRITE PESTS—WOOD.

FUMIGATION AND PLASTICS

News release discusses use-co-ordination of such diverse chemical products as plastics and fumigants in connection with infested bagged grain, seed, packaged or boxed foodstuffs. Methly bromide-plastic-tarpaulin method of disinfestation described.

WRITE PESTS—DOW

DEODORANT

Catalog includes price data, etc., on deodorant which it is felt can neutralize and deodorize such toxic agents as Thanite, Lethane 384 Special, Velsicol, etc. Also contains data on perfume oils for sprays made with pyrethrum and kerosene.

WRITE PESTS—MAGNUS.

OUTLINE OF USES AND RECOMMENDATIONS FOR ROTENONE DUSTS AND SPRAYS

By W. J. Haude, Entomologist

The object of this memorandum is to summarize for insecticide manufacturers and other interested persons some of the more important agricultural uses of rotenone-bearing insecticides. In all cases recommendations are based on those emanating from official state and federal experiment stations unless otherwise noted.

YOUR COPY MAY BE HAD BY ADDRESSING POWELL, c/o PESTS.

PYRETHRUM - DERRIS - RED SQUILL PRODUCTS

Leaflet describes foregoing insecticides with special bait chart for use in connection with powdered red squill.

WRITE PESTS—PRENTISS.

SOLVAY PRODUCTS

48-page booklet in colors and illustrated, covering their entire line of Alkalies and Special Products, with a special section dealing with Para-Dichlorobenzene and Ortho-Dichlorobenzene.

FREE COPY MAY BE HAD BY PEST CONTROL OPERATORS. WRITE SOLVAY, c/o PESTS.

RECHARGEABLE STORAGE FLASHLIGHT BATTERIES

Literature describes permanent type of rechargeable flashlight battery which eliminates worry about a dry cell shortage, due to the use of critical materials, and can, it is stated, equal in use as many as 400 or more dry cells. Instead of constantly using new cells and throwing them away, you simply recharge the battery and it's "just like new" again, manufacturer states. The addition of a few drops of distilled water and regular charging is all that is necessary for an unlimited amount of bright, steady light.

WRITE PESTS—IDEAL.

ELECTRIC FANS

Bulletin discusses value of electric fans in connection with fumigation work, also some pertinent thoughts on the Schafer Prone Pressure Method of Resuscitation, etc.

WRITE PESTS—AC-69.

MOLE KILLER PELLETS

Circular describes mole killer pellets which manufacturer states requires no traps, no gas, no exposed poison. Diagram of runways and explains how mole lives. Testimonial letters.

WRITE PESTS—CARAJON.

Business Opportunities

(Classified)

RATES — For individuals seeking employment, 5c per word, minimum $1.00. All others 10c per word, minimum, $2.00. All advertisments must be in the hands of the publishers seven days before publication date and must be accompanied by cash or money order for payment in full. The publishers are not responsible for any false or misleading advertisments.

Replies to advertisements where box number only is indicated should be addressed c/o PESTS, 512 E. 14th St., Kansas City, Mo., giving box number as well.

FOR SALE: Excellent Pest Control Business with Retail and Wholesale store in heart of Pennsylvania city of 80,000. No competitor in 200 miles radius. About $2,000.00 stock and exterminator business together for $4,000.00 cash.
B-32, c/o PESTS.

HOUCHIN'S INSECT POWDER DUSTERS

Made of Heavy Durable Metal

Holds 4 Oz. Powder Screened Cover

USED BY LEADING PEST CONTROL OPERATORS

Thos. W. Houchin Corp.

87 Ferry Street
Jersey City, N. J.

BUY . . . U. S. War Bonds and Stamps

PENETRATE—

YOUR TERRITORY WITH THE

MOTHPROOF LIQUID THAT "PENETRATES"

Now that woolen conservation is so vital to "UNCLE SAM'S" war program, there is still greater need for Moth protection. You can help "America" protect its valuable woolen materials by selling "PER-MO" Mothproofing Service. Full particulars and prices first letter.

PER-MO MOTHPROOF CO.

3729 Virginia, Dept. M. Kansas City, Mo.

- - BOOKS - -

Broaden Your Knowledge—Increase Your Proficiency—Help You in Your Business

Chemical Formulary, Volume V

It seems unbelievable that despite the previous publication of four previous volumes of the CHEMICAL FORMULARY, it should have been possible to collect enough new and different tested formulae—literally thousands of them—for a fifth book. The latest edition, like its predecessors does not duplicate a single formula that was in any of the previous volumes.

The formulas are those used in commercial concerns and have been collected through the efforts of a board of editors of 45 outstanding chemists. These editors, most of whom are connected with commercial firms, experiment stations or American colleges and universities, add considerable authority to the book.

The ground covered in this volume is more comprehensive than that of any previous one and the editor has done an excellent job in this compilation. In a ready reference and brief form he has placed before the layman as well as before the specialist, much information that might otherwise necessitate a great deal of time to ferret out.

The book is not one of formulas alone, but is written in a crisp and intensely interesting explanatory fashion which enhances its value to any private or industrial library. The fact that many practicing chemists engaged in one field of work are not familiar with the formulas in another field, and that much study and practice must go into compiling unfamiliar formulas makes this volume a ready source book of information.

Of special interest to the readers of this journal would be the chapter devoted to FARM AND GARDEN SPECIALTIES. In addition to these subjects the following are discussed in great detail: ADHESIVES, BEVERAGES, COSMETICS AND DRUGS, EMULSIONS AND DISPERSIONS, TEXTILES, FIBRE, SOAPS, CLEANERS, FOOD, INKS, LEATHER, SKINS, FURS, LUBRICANTS, OILS, FATS, MATERIALS OF CONSTRUCTION, METAL AND METAL TREATMENT, PAINTS, ENAMELS, VARNISHES, LACQUERS, PAPER, PHOTOGRAPHY, POLISHES, PYRO-TECHNIQUES AND EXPLOSIVES, RUBBER, RESINS, PLASTICS, WAXES, MISCELLANEOUS.

Volume V does not supersede but adds to the information given in the four preceding volumes of the set and we urge every reader to possess the complete series and to keep adding each new volume as it is available. Price $6.00.

Termites and Termite Control

An indexed reference book produced by the University of California Termites Investigation Committee of engineers, scientists, and business men in six years' collaboration.

Contains the latest researches in facts on termites, the latest practical methods for exterminators, builders and architects. Contains 795 pages, including index; profusely illustrated.

Price (the new edition), Cloth Bound.....$5.00

The Knack of Selling Yourself

The "Knack of Selling Yourself" is just off the press. It is a good book for every P.C.O. to have in his library, for it deals with ideas and methods of selling oneself to the public. Every P.C.O. has this problem and on the successful solution of this problem depends the success of his business. This book definitely aids in the solving of this difficulty, contains 234 pages and is full of new ideas. Order from PESTS. The cost is $2.50.

"A Manual for the Study of Insects"

This book of 401 pages and 633 illustrations is now in the twenty-first edition. Much space is given to accounts of the life histories and habits of insects. By means of the illustrations and analytical tables it is possible to determine the identity and classification of the common North American insects.

The Book Sells for $4.00

Practical Tree Surgery

By MILLARD F. BLAIR

An authoritative manual indispensable for Spray Operators and Tree Surgeons. It gives valuable information pertaining to the association between trees, fungi, and insects; and discusses the means employable in obviating some of the most serious injuries to them. Contains 89 excellent illustrations and line drawings.

Cloth binding .....$4.00 plus 15c postage
Special binding ..... 5.00 plus 15c postage

Our Enemy . . . The Termite

By THOMAS E. SNYDER

Senior Entomologist, Bureau of Entomology and Plant Quarantine, U. S. Dept of Agriculture

A book full of valuable information every member that deals with termite control should have.

Price $3.00

Insect Enemies of Shade Trees

By GLENN W. HERRICK

This book discusses primarily the problem of preservation of shade trees from insect pests also describing accepted methods of fertilizing shade trees. It is intended for pest control operators engaged in the business of treating and caring for shade trees, and for all others interested in preserving shade trees. The book discusses in detail all the important insect enemies of shade trees east of the Rocky Mountains, and most of those on the Pacific coast. The book is illustrated with 350 photographs and drawings. Contains 417 pages. **Price, $5.00.**

Imms Recent Advances in Entomology

As the title implies, is a book much enlarged, with many new illustrations, new facts of the past few years, with information of the advances along many paths of inquiry. It contains 94 illustrations and over 400 pages.

Contents in Brief: Some Aspects of Morphology; Metamorphosis; Paleontology; Sense Organs and Reflex Behavior; Fundamental Aspects of Coloration; Some Aspects of Ecology; Practical Application of Ecology; Parasitism; Biological Control. **Price, $5.00.**

"How to Know the Insects"

A very valuable book for every pest control operator. This book, with its 140 pages and more than 250 careful drawings, is an excellent reference book for P.C.O.'s as well as for experienced entomologists.

Price for spiral binding.....$1.00
Price for cloth binding..... 1.50

202 Common Household Pests of North America

BY DR. HUGO HARTNACK

A 320 page book dealing with 202 common household pests of North America and showing about 400 illustrations.

The book contains valuable information. It not only deals with all common and less common household pests, but also with rodents, pigeons, sparrows, spiders, centipedes and mites. All are arranged in a distinct systematic order which makes it easier for one to know the relationship of each pest.

A book that should be in every PCO library.

Price $3.85

The World of Insects

By CARL D. DUNCAN
Professor of Entomology and Botany
and GAYLE PICKWELL
Professor of Zoology
SAN JOSE STATE COLLEGE

In this new book the authors give a general view of a vast and fascinating world.

Comparatively brief and nontechnical, the book reviews the many fields upon which the insect impinges, discussing such topics as insect structures, how insects grow up, insect food and feeding habits, insect food-getting devices, how insects reproduce themselves, how insects get air, how insects move, how insects are protected, insect voices, insect fitness, insect orders, social life among the insects, the value of insects, injurious insects and their control, where to look for insects, rearing insects, and how to collect and preserve insects.

One of the outstanding features of the book is the collection of 194 unusual illustrations, including many striking photographs original with the authors.

393 Pages, 6x9, Illustrated.....$3.50

"Destructive and Useful Insects"

By METCALF AND FLINT

A new edition just recently off the press that not only deals with classification, identification and history of insects, but discusses the habits and control measures as well as suggested formulae. The book contains 981 pages with 584 illustrations. One of the most complete books of its kind on the market.

Price $7.50

Insect Pests

By WILLIAM CLUNIE HARVEY, M. D.
and HARRY HILL

The extermination of insect pests is no longer governed by haphazard, empirical procedure, but is a skilled science requiring the employment of rigid methods and of persons possessing considerable technical knowledge.

During recent years, the study of insect pests has received an increasing degree of attention, which is in every way justified when the effects produced by this type of nuisance is taken into consideration. This has resulted in benefit to the community. The foundation of successful vermin destruction is an accurate knowledge of the habits, life history and environment of the insect in question. It is only when this problem has been properly tackled and thoroughly understood that the chemical and mechanical means of combating pests can be utilized.

The authors have assembled a vast fund of practical information within the confines of a small handbook, which should be of great value to those who are called upon to play some part in insect control during the present emergency. Now when so many thousands of our men are brought together in training quarters, that which was formerly considered a nuisance has finally been recognized as a definite menace. Every war introduces problems in this particular line of activity and the authors have kept this fact before them in preparation of the material for INSECT PESTS. Because of this view point, this book is of special importance at this time.

Part I deals with Insect Pests, including the bed-bug, the flea, the louse and other vermin. Part II is devoted to the Principles and Practice of Disinfestation, including building construction and infestation, gaseous fumigants, technic of fumigation, educational measures for insect control, legislative control, human toxicology, and the disinfestation of foodstuffs and ships. There are two appendices containing forms and records and specimen propaganda leaflets; the book is well indexed and is attractively printed and bound.

Price $4.25

ORDER FROM PESTS, 512 EAST 14th ST., KANSAS CITY, MO.

Important

MOTH PROOFING

Information for the

Pest Control Operator...

MOTH PREVENTION! MOTH REPELLENCY! MOTH CONTROL! has always been a major concern to the American housewife. Why not meet her needs by using a product incorporating all three of these essential factors, our **insured** mothproofing compound,

"MORTOLIN"

"Mortolin" is oil soluble, non-poisonous, odorless, highly concentrated, economical to use.

LLOYDS OF LONDON, the largest insurance company in the world, has issued an insurance policy on **"Mortolin"** covering all damage by moths on jobs properly mothproofed with our material.

The quality of **"Mortolin"** is self evident and it is being used by over one-third of the pest control operators throughout the country.

"Mortolin" comes uniform at all times not only in color but in chemical composition. Your investigation is invited Samples and complete information sent upon request.

HI-TOX 20 IN PLACE OF PYRETHRUM EXTRACT 20 — NO PRIORITY, NO ALLOCATION NEEDED.

MORTICIDE FOR YOUR BEDBUG CONCENTRATE

ASSOCIATED CHEMISTS, Inc.

1906 N. Halsted Street

CHICAGO, ILL.